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COSTING

DONALD COUSINS

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TEACH YOURSELF

COSTING

By

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INTRODUCTION

ENCOURAGED by the success of "Teach Yourself Book-keeping", I am glad to have the opportunity of putting forward in the same series this book on Costing.

To write a Beginner's Guide on almost any subject opens wide the door to criticisms that this or that aspect has been omitted, or has been dealt with too cursorily; to do so in an essentially practical subject like Costing may savour of tackling the impossible.

Be that as it may, the time is long since past when Costing was the special and peculiar province of accountants, and accountants alone.

In the last twelve or fifteen years there has been an added impetus to the study of Management Accounting in all its many forms.

The emphasis so consistently laid by the Working Party reports on the importance of installing *and using* up-to-date methods of cost ascertainment and interpretation, the increasing status of the qualified accountant in industry, the retention of certain controls on labour and materials, the uncertainty of our economic future, and the insistence on efficient production and management—all these are weighty enough factors to assign for many years to come a leading place to the cost accountant in post-war trade and industry.

To those, then, who are raw beginners this book is offered, and at the end of Chapters IX, X, XI, XIV and XV there appears a selection of exercises which may assist private study.

Here I am glad to acknowledge the great courtesy of the Institute of Cost and Works Accountants, the Institute of Chartered Accountants and the Society of Incorporated

Accountants and Auditors in allowing me to reproduce certain questions from their examination papers of recent years.

And I add a short bibliography for the benefit of those of my readers who wish to take the matter further.

DONALD COUSINS.

AUTHOR'S NOTE

A new edition of this book being called for, I have—in response to numerous requests—provided the significant parts of answers to the questions following chapters IX, X, XI, XIV and XV.

DONALD COUSINS.

NOTE TO NEW IMPRESSION

In this Edition a chapter on "Some aspects of Management Accounting" has been added.

CONTENTS

CHAPTER I

WHAT IT IS ALL ABOUT

Question. What is Costing?

Answer. The term covers all those accounting and financial procedures which go to provide a tool for business management and a technique of control.

The outlay incurred by the business is measured, classified and interpreted in relation to its income so that the best possible operating results can continuously be got.

Question. Is it more than Cost Accounting?

Answer. For many years Costing was regarded as an offshoot of the work done by the financial accountant. The accounts prepared by him—usually for a past period—were broken down into their component parts in an attempt to estimate the profitability of this or that product or department.

To-day it is much more widely recognised that cost interpretation is at least as important as, if not more important than, detailed expense allocation.

Thus the presentation of cost accounts is only part of the story.

Question. Why does Costing have so much publicity to-day?

Answer. Firstly, because the idea of arriving at selling price by adding the desired profit to estimated cost is, generally speaking, no longer tenable save in the artificial circumstances of a "sellers" market. With a revival of competition in the home market and abroad the selling

A*

price may be fixed by a more efficient trade rival, or by what the customer is able and willing to pay.

Therefore, if the business costs are too high, it will make only a small profit or no profit at all.

Secondly, because business people have realised that not the Accounts department alone but the whole organisation should be cost conscious if productivity is to be increased and the most economical use made of the resources available.

And thirdly, because new refinements of cost control, at which we will look later, enable actual results to be compared with a predetermined plan formulated after careful discussion by all interested parties.

Question. Can you be more explicit about the benefits of a cost system?

Answer. Perhaps in this way—by suggesting that

(*a*) such a system supplies a basis for attempting to fix selling prices;

(*b*) comparisons can be made between current costs and those incurred in earlier periods;

(*c*) an indication can be given as to which products, processes or departments are paying best;

(*d*) costs can be grouped to tie up with management responsibility, as for example where an executive has it in his power to influence or control some particular outlay;

(*e*) as an adequate system of cost accounting is an essential part of the control exercised, the information given by the financial accounts is reinforced and extended;

(*f*) proper methods of expense booking, wage computation and of the receipt and issue of materials must be in use if any cost system is to function satisfactorily;

(*g*) from information coming into the Cost office, reports may be prepared dealing with such matters as normal (and abnormal) scrap losses, losses due to waiting for orders or for raw materials, or because of plant breakdown. And these reports should be drawn up in such a way as to facilitate prompt remedial action by the management.

Question. Costing then affects business management as well as the accountant?

Answer. It affects vitally every aspect of the business—production, sales and general administration. This implies that whoever is responsible for the work must be thoroughly familiar with what is happening on the floor of the factory, and he must also be aware of what is being planned for the future.

A flexible outlook is of the first importance to ensure that the system of control is never rigid and unadaptable to changing circumstances. It should fit the business, not the other way round.

Question. You spoke of the Cost office. Does this form part of the general Accounts department?

Answer. No two businesses are alike in this respect, and it is impossible to dogmatise.

Sometimes there is no separate section, the cost accounting work being done in the general office, often by the general accounting staff.

The results obtained can then be summarised in a monthly or quarterly report, supported by schedules of expense analysis.

In other cases, a cost clerk or cost accountant is employed in addition to the chief accountant or secretary. He may have his own staff and a well-defined sphere of action, and he may be responsible to the chief accountant, or to the

works manager, or directly to the managing director of the company.

Usually it is found that the cost records are reconciled, approximately or exactly, with the financial books, though this refinement is not always insisted on.

But, instead of maintaining two separate sets of books, a practice growing in favour—certainly in the larger firms—is to have *one* accounting system, and to construct it in such a way that it provides both year-end accounts (for proprietors) and monthly statements (for management). With this, of course, the problem of periodic reconciliation disappears.

Question. Is it then, to some extent, a question of the size of the firm and the range of its products?

Answer. Partly that, partly the extent of management's awareness of the need for costing information, and partly the degree of precision with which costs are to be determined.

For example, the cost of an ocean-going liner would not be calculated with such detailed accuracy as the cost of a yard of cloth.

Question. Is Cost Accounting a profession?

Answer. In the narrow sense, no. It should rather be regarded as a branch of the accountancy profession as a whole. What is significant is that the works or cost accountant comes constantly into far closer contact with the inner business problems than the practising or professional accountant can hope to do. He is a full-time employee of the business and has the opportunity to concentrate on its production and sales requirements.

In short, he becomes something of a specialist in the particular industry.

For many years past, a separate professional body has

been in existence—the Institute of Cost and Works Accountants, which admits members by examination after proof of adequate practical experience.

Question. What are the qualifications of a Cost Accountant?

Answer.

1. A sound grasp of the theory of cost accounting and its application to the industry in which his firm is engaged.
2. A good understanding of the structure and the processes of that industry.
3. A knowledge of financial accounting and of statistical method.
4. The ability to interpret the facts and figures for the benefit of the entire organisation.

   This calls for simple, understandable and yet complete reports.

   And last, but by no means least—
5. A knowledge of human nature.

Question. Lastly, would you tell me what items go to make up Cost in the sense you have been talking about it?

Answer. Recurrent items of a revenue character.

That is why a basic knowledge of the theory of financial accounting is so important. The detailed Trading and Profit and Loss Account contains this information and sometimes items of non-recurring income and expense.

gist

Primarily, the cost accountant is interested in revenue expense and he is intimately concerned with the answer to the question—"Has the business derived benefit from the outlay, and is that benefit in line with what it has a right to expect?"

It is not enough to assemble debits and credits; they

have to be considered (if they are of a revenue character) from the point of view of the responsibility factor, the yield factor and the extent to which they are affected by seasonal or other changes in the level of business activity.

But what we must first do is to survey the internal structure of the business unit and see how and why these expenses arise. That unit is not static; it is constantly developing, and the developments involve an increase or a reduction in expense about which the cost accountant has to be constantly mindful.

CHAPTER II

THE STRUCTURE OF THE BUSINESS

IN considering the ascertainment and interpretation of results it is most important to try to visualise the set-up or organisational features of the business.

In this chapter we will look at some aspects of the arrangements that might be met in a medium-sized manufacturing concern.

A clear idea must exist of the purpose which the business serves, and for which its capital was subscribed. The fulfilment of this purpose is the responsibility—varying only in degree—of all those engaged in the enterprise.

In the first place, a distinction has to be drawn between the Administrative and the Executive function. The former, broadly speaking, deals with the basic objects and policies whereas the latter deals with the organisation and control of the human and mechanical elements. The former says *what* shall be done, while the latter indicates *how* it shall be done.

The board of directors lays down the general lines of policy, and it is the task of the executive or higher management to see that that policy is carried out.

Throughout, the cost accountant must know with whom he is to reckon; what he may expect from them; and what they look to him to provide. This is an indispensable preliminary to the installation of any worth-while system of cost control, because bad or faulty organisation will almost always lead to waste and overlapping.

For this reason the functions and authority of each executive member of staff should be clearly defined and approved by the managing director as chief executive. It

can then be seen which functions are vital, and which are comparatively incidental to the fulfilment of the main purpose.

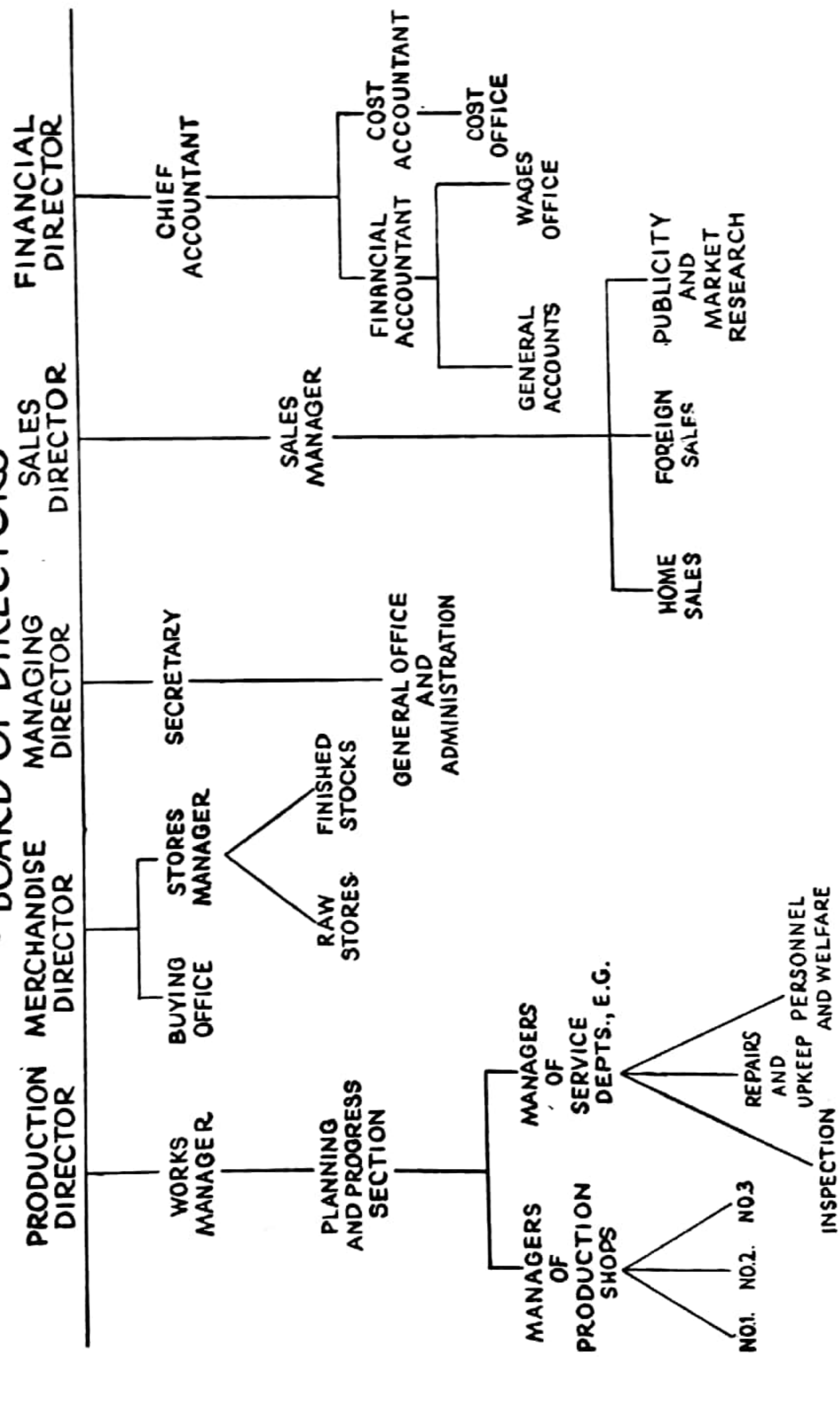
In this connection organisation charts and manuals have a most useful part to play. Their preparation calls for careful thought as to the precise scope of duties of each senior and junior executive, and many doubts and uncertainties have to be resolved before they emerge in their final form. From the costing standpoint such overall surveys emphasise the interdependence of the various sections into which the business is divided.

A specimen form of organisation layout is given below, and it makes some attempt to show, not only the divisions themselves, but also the chain of responsibility from board level to junior management. Further, for each of the four main divisions—Production, Warehousing, Finance and Sales—it is a good plan to prepare a detail breakdown of jobs and processes, and to try to ensure that the position is grasped by foremen, charge-hands and section leaders.

Sometimes, too, it is wise to encourage the setting up of divisional management committees, each presided over by the appropriate director, which report to the board via the managing director on matters that involve, not infrequently, the study of problems of a costing nature.

On the one hand, expense is being incurred in each of the four divisions and this expense must be recorded not only in total in the financial accounts, but in detail as regards the section which has derived the benefit. On the other hand, the divisions are interdependent and must realise the fact. Thus, the works manager relies on the continued availability of raw material stores, and the sales manager on the maintenance of stocks of finished and merchanted goods. From another angle, the managers of the production departments rely directly on both the Stores and the Labour office.

Drafting the outward form of organisation is only the


• BOARD OF DIRECTORS •
PRODUCTION DIRECTOR
MERCHANDISE DIRECTOR
MANAGING DIRECTOR
SALES DIRECTOR
FINANCIAL DIRECTOR
WORKS MANAGER
BUYING OFFICE
STORES MANAGER
SECRETARY
SALES MANAGER
CHIEF ACCOUNTANT
PLANNING AND PROGRESS SECTION
RAW STORES
FINISHED STOCKS
GENERAL OFFICE AND ADMINISTRATION
FINANCIAL ACCOUNTANT
COST ACCOUNTANT
COST OFFICE
WAGES OFFICE
GENERAL ACCOUNTS
HOME SALES
FOREIGN SALES
PUBLICITY AND MARKET RESEARCH
MANAGERS OF PRODUCTION SHOPS
NO.1. NO.2. NO.3
MANAGERS OF SERVICE DEPTS., E.G.
INSPECTION
REPAIRS AND UPKEEP
PERSONNEL AND WELFARE

first step, but the putting into effect of the policy decided upon is the vital thing. Subsequently, and as a continuing task, it has to be seen how far the results got measure up to the policy or call for its amendment.

In an established business, with a more or less fixed amount of financial resources, production facilities exist to provide a given output. What is the type and range of the manufactured products which that output represents? Can they be sold through existing outlets? If not, is the cost of re-design or of new methods of publicity likely to be justified?

With a new business a careful survey of the nature and extent of the prospective market will be needed; its probable duration and the kind of competition likely to be met. Decisions thus required at board level will affect all executive staff, and the cost of a mistake by using the firm's resources in the wrong direction may be so heavy as to jeopardise the firm's financial integrity.

For a given output, the amount of outlay by each division must be calculated as closely as possible, especially as regards working capital resources, out of which all the operating costs have to be met. Here, consideration has to be given to the time factor—the time taken to manufacture, and the period of credit to be allowed to customers.

So far as each division is concerned, we must now look a little more closely into the position, bearing in mind that some outlay bears directly on the job in hand while other outlay is only indirect. Having regard to the character of the industry, is a proper balance kept between them?

Production. To cite an extreme case, if highly skilled craftsmen only were employed, instructions might be given to them directly by the works or departmental manager. But if unskilled or semi-skilled labour is used, or if it becomes a question of deciding in which department a particular job shall be done or what are the relative

priorities of different jobs, then in such circumstances a production plan must be built up by a planning and progress assistant to the works manager. There is also the matter of supervising the proper flow of materials from raw stores and the services of the Labour office in recruiting and training the right kind of workpeople.

Although it may be true to suggest that the apparent cost of the product is restricted to the wages paid to the actual producer and the value of the materials consumed, nevertheless an essential service, albeit of an indirect character, is being rendered by those who plan behind the scenes and see that promises, both as regards quality and delivery date, are being fulfilled.

In just the same way the works management depends on auxiliary sections to ensure that work-in-progress, for example, conforms to the specification laid down. Components made now may be assembled weeks hence, and delay because of defective quality may mean a lost shipment and loss of the customer's goodwill. Sometimes, too, human lives may demand a most rigorous inspection of the finished product.

Further, unless the plant and machinery are maintained in efficient working order, the cost of machine breakdown may be serious not only of itself but by reason of the congestion caused by other work piling up behind the process involved.

Sufficient has been said to justify the absolute necessity for a close understanding and collaboration between every member of the *production* staff, and this holds good for each of the other divisions.

MERCHANDISING, or warehousing, should be regarded as the balance wheel between Sales and Production.

In some cases it is possible to make for stock and deliver from stock in satisfaction of orders for a standard product, which is in virtually constant demand. In other cases,

works production may only be begun when the sales order is received.

The merchandising section, too, must be aware of the cost possibilities of alternative raw materials that might be used with equal or greater advantage.

Unsuitable raw stores or slow-selling finished stocks, if ignored and allowed to accumulate, not only represent unproductive working capital, but the extra sales effort required to dispose of them may entail an altogether disproportionate cost.

It must never be forgotten that the buying department is responsible for a cost component that may easily amount to a third of the total business outlay on Revenue account. Bad buying, resulting in the carrying of stocks at uneconomic values, penalises the firm from the outset and puts it at an initial disadvantage in comparison with its competitors.

As regards the *Sales* division proper, it is most important to appreciate that this represents the link between the business and the outside world.

Costs of production are one thing; distribution costs are something very different, and the Sales section must be ever alert to assess the effect on the market of adjusted trade discounts or altered methods of packing and delivery, all directed to ensuring that the business is getting a fair share of the available trade.

Market research in this connection is as vital to the sales manager as technical research and laboratory facilities are to the production department.

It is always desirable that due weight should be given here to the education of salesmen in an understanding of the requirements of customers' businesses, but above all it is imperative that the closest link is established between the Sales and Production divisions for the reason that the Sales section can interpret customers' wants to those on the job, while at the same time explaining both works' possibilities and works' difficulties to the prospective buyer.

Finance and Accounts

In a general way, the functions of the chief accountant will include

(*a*) the maintenance of adequate records leading to the preparation of monthly as well as annual Profit and Loss statements and Balance Sheets;

(*b*) the submission of reports—as required by the board —covering the present and estimated future revenue and working capital position; and

(*c*) collaboration with the cost accountant in promoting the smooth working of the cost system in use.

Depending on the nature of the latter this may imply the necessity for an approximate "tie-in" between the cost books and the financial accounts; whereas if one set of records only is kept these should be such as will meet the requirements of both proprietorship (annual) accounts, and management (short period) accounts.

Here it may be noted that separate cost records may have developed as an offshoot from the financial books, and to some extent may be dependent on them both as regards the supply of original data and the amount of ground covered.

But where the two are integrated the probability is that the accounting system will give greater weight to management needs than to the annual Revenue Accounts and Balance Sheets issued to shareholders. The latter then become almost a by-product of the main, or management accounts.

This is the significant development to-day, although in the small or even medium-sized business it may be still only a more or less remote target.

To revert to the form of organisation chart shown above, a word may be added about the help it gives the cost accountant in drafting his reports to different levels of

management. At board level the figures will be highly summarised—perhaps on a single sheet of paper. But for the relative director or divisional manager analysed statements must be submitted, and in the case of works and departmental managers, for example, the data will be still further broken down.

Control, whether at higher or lower levels, implies responsibility to the superior and ultimately to the shareholders whose invested capital is at stake.

The cost accountant has it in his power to facilitate the task of management by a constant grasp of the purpose to be served and by being ever mindful of the fact that the strength of a cost system is the strength of its weakest link.

Plans written on paper are useless unless they are made intelligible to those who have to carry them out, and unless there is such an overall understanding of mutual rights and responsibilities as will lead to intelligent co-operation.

The Cost office has to serve the business as a whole, and it has to do so by removing the causes of departmental jealousies and misunderstandings just as much as by the periodic submission of numerical statements and working reports.

CHAPTER III

GETTING TO KNOW THE EXPENSE

In studying the merits of an existing system of cost control, and especially where nothing of the kind has been introduced before, it is important to ascertain the nature and amount of the expense that is being incurred at the moment.

In this way a definite and factual basis can be got for comparing current outlay with the activities of the business, in seeing which shops, departments or processes are responsible for the relatively bigger items of expense and, ultimately, in judging whether value is being obtained for the money laid out.

This kind of approach will be greatly assisted if anything exists in the form of short-period accounts which have been prepared in the light of information given by the ordinary financial books. No business undertaking to-day with any pretensions to even a minimum standard of management efficiency will be willing to rely solely on its annual Trading and Profit and Loss Account, particularly if prepared on the old, conventional lines.

The day-to-day conduct of affairs and the certainty that progress reports will be called for at monthly board or staff meetings make it essential to compare sales or output with summaries of the normal and recurrent expenses of the firm. And it must be clearly realised that such interim statements may exist altogether apart from a formal costing system.

A monthly or quarterly Revenue Account and Balance Sheet can play a useful part in gauging the trend of profits on the one hand and the apparent liquidity position on the other. Almost always, too, the opportunity exists for com-

paring current results with those of the previous period and with the cumulative position to date.

But where no information of this kind is available, or should its reliability be open to question, it is much the better plan to begin entirely afresh, taking the audited annual accounts as the basis and reading the (detailed) audited Trading and Profit and Loss Account in conjunction with the Nominal or Impersonal ledger. The latter will usually record the bulk of the revenue items even if in total only.

At the same time the investigator must have a clear understanding of the manufacturing processes and the sequence of operations in the factory. He must know the contribution each makes to the finished product and, to help clear thinking in preparing cost assemblies, it is often a good plan to chart or diagram the progress of the work from shop to shop or from process to process.

In this way the preliminary inquiries will keep in step with the facts of the situation, and he will be able to defend his conclusions if they are challenged by technical experts.

Probably one of the major difficulties to be overcome when beginning entirely afresh arises from the necessity to analyse at successive stages the various Nominal ledger expense accounts.

Thus, this ledger may contain one account for wages, or two accounts headed "Direct wages" and "Indirect wages". If a pay-roll analysis exists (as it normally will), the task is at once simplified, but if not, the breakdown of labour costs is indispensable to get a clear first picture.

For this purpose "Direct wages" implies amounts paid to all workers on the production line, while "Indirect wages" is the total paid in respect of service facilities of whatever kind that are incidental to the production flow.

Suitable analysis here would distinguish between wages paid to storekeepers, progress clerks, engineers and maintenance men, to list some only of the typical headings.

As between the two, the following are a few of the considerations that arise at the outset:

(*a*) To a large extent direct wages vary in proportion to factory output, and a reduced demand may result in standing off workers or shortening the working week.

Conversely, the need for more production will lead to more labour recruitment or to overtime working, or to the introduction of incentive payments.

(*b*) With direct labour cost there is a tangible result in the shape of the work done. The part-finished product can be inspected and, indeed, as a piece or batch of articles, may form the basis of the actual wages paid.

(*c*) In this way the cost so far incurred may be compared with the estimated sales value of the product itself, and with the amount of labour cost allowed for in the original tender or quotation.

(*d*) By contrast, "Indirect wages" represent largely a part of the permanent service provision in the absence of which it would be difficult or impossible for the labour directly employed to function efficiently at all, and this often irrespective of the size of the business output.

Thus, the productive plant and tools must be efficiently maintained by an engineering or plant repair section, while a constant flow of raw materials to the factory requires the services of a stores manager and his assistants.

Labour of this type stands well outside the direct production line, but it is essential to maintain it if production plans are to be fulfilled.

In much the same way the "Purchases" account in the Nominal ledger must be carefully scrutinised, and this involves a similar analysis of the stock position.

Materials consumed represent purchases adjusted by reference to the opening and closing stocks of materials. But "Purchases", unless divided into direct and indirect groups, may include both raw materials and finished

components as well as stores requisites and engineering and maintenance sundries.

While raw materials used directly on the job are one thing, cleaning materials and sundry stores are bought for use in the service sections concerned, and are therefore Indirect supplies.

The consumption of production raw materials will vary from time to time in line with the volume of output or the requirements of individual products, but there is unlikely to be any comparable movement in service stores.

For these and other reasons it is very important, in trying to measure the costs of output, that the emphasis is placed on what goods have been used, rather than on what goods have been bought.

Apart from the kind of preliminary analysis suggested above, it will be readily appreciated that no worthwhile figures of the cost of output for the current period could be arrived at if the stock of finished product itself were brought into the picture; if only for the reason that the proportions of finished stocks to the total held might well vary from month to month, while in any event the book value of the commencing finished stock would largely be based on the production costs of the previous period.

At this point it will be realised that Nominal ledger total accounts demand both analysis and re-analysis to get to the root of the matter and, assuming the financial books are retained unaltered, the underlying detail has to be shown either as casual memoranda or in the form of independent cost records which shall be capable of reconciliation with the financial books at convenient intervals of time.

Elsewhere in the Nominal ledger, and certainly in that part of the detailed Revenue Account which is usually called the Profit and Loss Account will be found those indirect expenses which are variously styled "Overheads", "Oncost" or "Establishment Charges".

In some cases an attempt is made to group them in a general way as expenses of Production, Distribution and Office administration. While this is much more helpful than a recital of the account headings perhaps in the order in which they appear in the Nominal ledger, the investigator will want to satisfy himself that if the expenses are directly traceable to production as part of the manufacturing programme, the relationship is properly established.

A ledger account for "Fuel" may include the cost of fuel used for furnaces in one or more works departments, and that consumed by power plants for operating the machinery as a whole.

The former is a direct, and the latter an indirect expense. Moreover, it may be found that certain products have to be re-heated or re-stoved as a routine part of their manufacturing process involving, if their cost is to be accurately ascertained, a double or treble charge as compared with another product where this special treatment is not required.

Inquiry, as well as analysis, is indispensable in bringing the facts to light if it is to be seen where the weight of the expense lies and if there is to be any assurance that the selling price of the individual products takes note of all the expense that is directly referable to them.

Transport charges or "Carriage and Delivery" account may, in the first instance, call for division between incoming and outgoing goods. Generally speaking, carriage inwards on raw materials is an addition to the direct cost of the materials used for production, whereas delivery costs to the customer—if borne by the business—are an obvious part of its distribution expense.

Thirdly, the Profit and Loss item of "Salaries" should be analysed and charged to the functions in respect of which the services have been rendered. There is rarely any justification for treating the item as an unidentifiable part of the general overhead costs.

Here, again, analysis and re-analysis may be involved,

the first step being to isolate the weekly or monthly salaries chargeable to production, to distribution, etc. The second step is to allocate as accurately as possible production salaries to the several departments in which they have been paid.

Only in this way can the Revenue Account be re-shaped to make possible a study of the inner workings of the business in a manner which is vital for management purposes, but apart from those that are the subject of actual cash outlay the Revenue Account will contain as expense items some that are no more than estimates and are purely in the nature of "paper" or bookkeeping transactions.

In this category, for example, come provisions for depreciation, obsolescence and doubtful debts. Such expenses are none the less real because of their intangible character in the year under review. At some future date cash will be required to replace plant and machinery or to replace cash lost by reason of a customer's default.

One works department may be more fully mechanised than another and must bear the appropriate charge for depreciation in exactly the same way as it would have included in its costs the charge for hiring the machinery in use.

Estimates in cost records are of just as much importance as in financial books if the full story is to be told, and if there is to be any ultimate agreement between the two.

It must be recognised, however, that in the annual Revenue Account items may appear which are of an exceptional or non-recurring nature; or which arise from the type of capital structure adopted.

Certainly the former, and possibly the latter, should be excluded by the cost accountant since he is primarily concerned with the recurrent expenses affecting the main activity of the business.

Instances of exceptional expense written off in the

financial books include losses on the sale of fixed assets and payments under guarantees given to third parties.

Interest on debentures or other fixed loans relate to the way in which capital resources have been provided, and the cost of financial provision as a whole calls for a close study of the facts and of the purposes for which the costing information is required.

To sum up, therefore, it may be said that the financial books of account supply a reliable basis for first inquiry and for ensuring that all items of revenue expense are brought under review.

In the case of a limited company they are required to be kept so as to facilitate the giving of a true and fair view of the overall profit or loss.

To trace profit to its source, to estimate the comparative profitability of different products, and to check waste and inefficiency something more is needed. And that "something more" must be provided either by a re-organisation of the financial books or by the setting up of cost books reflective of the facts which analysis and discussion between responsible executives have made available.

CHAPTER IV

REDRAFTING THE REVENUE ACCOUNT

THE first of the two examples given in this chapter is designed to illustrate some of the points to which reference was made in the last few pages.

CASE 1

A company prepares accounts half-yearly on June 30 and December 31.

The following balances were extracted on June 30, 1953:

	£
Stocks at cost—January 1, 1953	3,669
Purchases	6,986
Wages	4,391
Salaries and expenses	6,012
Distribution expenses	1,297
Administration expenses	864
Rent	775
Carriage inwards	293
Sales	19,323

Stocks at cost (apart from stocks of the finished product) on hand on June 30, 1953, amounted to £3,213.

(*a*) Analysis of the ledger accounts gives the following information:

Stocks	*January* 1	*June* 30
	£	£
Finished product	1,006	—
Materials	2,328	2,838
Containers	335	375

Purchases	£
Materials	6,269
Containers	717

Salaries and expenses	£
Factory	2,185
Other	3,827
Rent	£
Factory	675
Office, etc.	100

(*b*) The output of the finished product for the half-year was 10,000 units.

(*c*) The stock of the finished product on June 30, 1953, was 1,500 units.

(*d*) 1,000 units produced during the period had been invoiced at £1,500 and treated as sales, but were still held by customers on sale or return on June 30, 1953.

(*e*) Certain materials purchased at 30s. a tin during the year 1952 and included in the stocks at cost have been found unsuitable for manufacture; the sales include 1,000 tins of those materials sold during the half-year at 25s. per tin, and 200 tins were in stock on June 30, 1953, when their market value was 21s. a tin.

It is desired to prepare a revenue statement for the half-year to June 30, 1953, in such a way as to facilitate the extraction of costing information.

The first point to note is the necessity to distinguish between the *manufacturing* and the *trading* operations; i.e. between materials and containers on the one hand and the finished product on the other.

Secondly (para. *e*), that exceptional or non-recurring transactions must be shown as a matter entirely separate and apart from the normal production flow.

Thirdly (para. *d*), that the units held by customers on sale or return call for a deduction from sales and an addition (at cost) to stocks.

In the circumstances, the suggested method of display is as follows—the detail adjustments being shown inset:

OUTPUT 10,000 UNITS

				Cost per Unit		
Materials		£				
Opening stocks . . .		2,328				
less 1,200 tins @ 30s. .		1,800				
		528				
add purchases . . .		6,269				
	£	6,797				
less closing stocks .	2,838					
200 tins @ 30s. .	300					
		2,538	£			
			4,259			
Containers						
Opening stocks . . .		335				
add purchases . . .		717				
		1,052				
less closing stocks . .		375				
			677			
Carriage inwards			293			
			5,229			
Wages			4,391		*s.*	*d.*
Prime Cost			9,620		19	3
Factory expenses		£				
Salaries and expenses . .		2,185				
Rent		675				
			2,860		5	9
Factory Cost . .			12,480	*Per Unit* £1	5	0

	£	£	£
Trading			
Sales		19,323	
less sale or return issues . .	1,500		
sale of materials . .	1,250		
		2,750	16,573
Opening stock—finished product . .		1,006	
add output, as above		12,480	
		13,486	
less closing stock, including S. or R. 2,500 units @ factory cost . .		3,120	
			10,366
Trading Profit			6,207
Office salaries and expenses			3,827
Distribution expenses			1,297
Administration expenses			864
Office rent			100
Loss on unsuitable materials			340
			6,428
less trading profit			6,207
Net Loss			221

In the manufacturing statement it is seen that factory cost per unit is £1, 5s. od., approx., and this forms the basis for the valuation of the adjusted closing stocks on June 30, 1953.

CASE 2

The second example goes further, and involves the preparation of a cost sheet to determine for the year under review the cost of production of the output of bricks.

Again, it is a matter of recasting the pro-forma Revenue Account in order to distinguish between what are fundamentally *revenue* costs and *capital* costs.

A firm owns and operates a brickyard, and the books show the following results for the year ended December 31, 19—:

Brickyard Account

	£		£
Stock at January 1:		Sales:	
200,000 bricks .	700	4,025,000 bricks .	18,515
Wages . . .	14,870	Stock at Dec. 31:	
Stores . . .	7,600	300,000 bricks . .	1,200
Fuel . . .	3,955	Balance—loss . .	9,490
Salaries . . .	850		
Head Office expenses	1,230		
	29,205		29,205

The partners are aware that the above figures are distorted by the inclusion of the costs of construction during the year of an additional kiln and they ask you to make the necessary adjustments. You are informed

(1) that 1,000,000 of the bricks made in the current year were used in the construction of the new kiln;

(2) that no precise records had been made of wages spent on the new kiln; the workmen had worked part of their time on the building of the new kiln and part on the ordinary work of brickmaking;

(3) that the wages cost for making 1,000 bricks (including spoilage) in the previous year was 45s. and that an advance of 10 per cent. had been in operation throughout the current year;

(4) that, in the current year, 75,000 bricks were spoiled in the course of manufacture;

(5) that £250 of the Salaries, £5,550 of the cost of Stores, and £200 of the Head Office expenses were properly attributable to the new kiln, the balance of the Head Office expenses being Selling expenses;

(6) that the closing stock valuation is to be adjusted to brickyard cost.

It is required to reconstruct the Brickyard Account for the current year, showing the amounts chargeable to Capital Expense in respect of the new kiln.

Institute of Chartered Accountants. November, 1948.
Final Examination (adapted).

COST SHEET 19—

Output	5,200,000	bricks.
less spoilage in course of manufacture	75,000	
	5,125,000	Output of saleable bricks.

	Total	*Per 1,000 Bricks*
	£	
Wages (including spoilage)	12,870	
Stores	2,050	
Fuel	3,955	
Salaries	600	
	£19,475	£3 16 0

RECONSTRUCTED BRICKYARD ACCOUNT

	Quan.	£		*Quan.*	£
Stock at Jan. 1	200,000	700	Sales . .	4,025,000	18,515
Output, as above .	5,200,000	19,475	Used for new kiln, at cost .	1,000,000	3,800
Gross profit .	—	3,280	Spoilage .	75,000	—
			Stock, at cost	300,000	1,140
	5,400,000	23,455		5,400,000	23,455
Head Office expenses (balance). .		1,030	Gross profit . . .		3,280
Net profit . . .		2,250			
		3,280			3,280

New Kiln

	£
Bricks used—1,000,000 @ £3, 16s. od. (above) .	3,800
Wages (balance)	2,000
Stores	5,550
Salaries	250
Head Office expenses	200
Capital Expense . . .	11,800

CHAPTER V

THE LIMITATIONS OF ANNUAL ACCOUNTS

Question. As I see it, the objections to the yearly Profit and Loss Account are chiefly these—that it deals with expense totals only, and that it is drawn up at too long intervals of time?

Answer. That is true as far as it goes, but a further reason for its unacceptability to management is that it is essentially a statement of the result of a past period.

For this reason cost conclusions drawn from it on the basis of a detailed analysis of expense are usually referred to as historical costs.

Question. You mean, a post-mortem to find out where and why the business results were not better. Isn't that of value?

Answer. It is most important to know why results have not come up to expectations, but the point is that if the trouble arose in the early part of the past period, no steps can be taken to correct the position until several months have elapsed if people have to wait for an annual Profit and Loss Account, and if there is no alternative source of information.

Question. A half-yearly or quarterly Profit and Loss Account would get over this difficulty?

Answer. It would certainly reduce the time lag and limit the field of error, but the big objection remains—short-period accounts of themselves are still not much more

than a historical survey, while their scope is by no means limited to costing considerations.

The vital thing for management to know is what is happening now, not what happened a few months ago.

Question. I should not have thought there would be any very marked changes, taking one year with another?

Answer. But indeed there may be. For example, if last year the business manufactured a variety of goods each different in cost and selling price, and therefore of varying profitability, it does not follow that the same pattern of demand will exist in the present trading period.

Costs now incurred may have to be looked at to see how far—with less profitable articles—cheaper but nevertheless adequate raw materials can be substituted.

Last year, too, the firm may have had the benefit of bulk contracts at very remunerative prices, whereas this year these have not been renewed to anything like the same extent.

Again, new plant may have been installed quite recently, with the result that operating costs and depreciation will weigh more heavily now than they did before.

It is perfectly right to profit from the lessons of the past, but it is with the present period and the months ahead that management has to reckon.

Briefly then, while the same *kinds* of expense may recur, their *amount* may differ quite appreciably.

Question. You have in mind changed material prices and wage rates?

Answer. Not only that. If goods that were formerly merchanted are now being made by the business, then presumably purchases will be less and wages more, apart from the effect on indirect expenses.

In the reverse direction—with a falling off in demand

for the time being—you should expect some similar drop in wages, purchases *and* in the stocks that the business is carrying.

All this implies that present conditions and present trends have to be carefully studied and arrangements made in advance of the event, and not afterwards.

Question. Doesn't this involve a certain amount of guesswork; I mean, substituting estimates for facts with a consequent loss of accuracy?

Answer. We have agreed that even historical accounts include estimates, but that need not lessen their value—primarily as accounts of stewardship—if the estimates are made by competent people.

To know what is happening now, monthly Profit and Loss Accounts are indispensable, and the crux of the matter is that they should be available to management within a week of the end of the month to which they relate.

This calls for a really efficient organisation in the Cost and Accounts offices, but substantial rather than absolute accuracy is the target to aim at.

You would not bring shillings and pence into statements of this kind, and, unlike the annual accounts, it may be a good thing to include quantities as well as values, particularly where as part of the manufacturing process there is a recognised wastage or scrap loss of the raw material input.

To the trained eye, discrepancies in quantities may be much more immediately significant than changes in money values.

As regards the future, my view is that a business which has made no plans for the ensuing twelve months is like a ship without a compass; it cannot chart its course ahead if, to take one factor only, it is unaware of possibilities which may either benefit or prejudice its own suppliers and customers.

And it is equally important, not only for the board but for each executive, to see from time to time—say at monthly intervals—how far the actual course conforms to the planned course.

An alert management will be quick to see the value of this, and so value more fully the services of its Accounts department.

Question. Now that we have dealt with the two points of view—backward looking and forward looking—can we turn to the elements of cost and see how they are measured and controlled?

Answer. It will be better to take first the items of Prime or First Cost in the form of materials and wages, linking them with the organisation of the Stores and Labour sections of the business.

CHAPTER VI

PRIME OR FIRST COST

In a manufacturing business Materials and Wages afford tangible evidence of cost—in the usage of materials and the working of the production process.

Given the existence of a planned programme, or of a system of budgetary control, the availability of materials and labour as and when required can be ensured (see Chapter XII), but for the present purpose it is sufficient to presume that adequate stocks are carried and a labour force of the size required is engaged.

It becomes important then to consider the underlying arrangements and records altogether apart from the entries in the financial books of account.

Materials

Taking the term in its widest sense, a distinction can be drawn between stores and stocks.

The former include:

Production raw materials

Service stores—

Manufacturing supplies
Repairs and maintenance stores
Oil, fuel, etc.

The latter comprise stocks of the finished product and of components, either produced in the factory or bought outside.

Depending on the size of the firm, the number and range of goods to be carried in stock, any special requirements for

storing particular classes of goods, etc.; one or a number of warehouses may be needed at stages along the production line if manufacturing operations have been arranged to permit a flow of work from shop to shop.

All goods should be coded by letter or number (*a*) to ensure absolute uniformity of description, (*b*) to reduce clerical labour for writing specifications, requisitions, etc.

Proper bins, containers or other fixtures must be provided in each warehouse and, generally speaking, the rule enforced that in these are kept the whole of the relative stocks, i.e. material should not be delivered to the production shop or particular process.

Where possible, each fixture should carry a bin card (see page 39) recording quantities received and issued, or alternatively fixtures should be numbered, and the numbers so indexed as to facilitate reference to the Stores ledgers.

It is indispensable that a physical check, count or weight be applied to all goods immediately on receipt, or as soon afterwards as possible. Only in this way can the correctness of the supplier's invoice, as regards quantities at least, be attested.

It should be impressed on all concerned with stores or stocks in any form that they are continually responsible for what may amount to a substantial part of the firm's working capital, and it may be necessary throughout the trading period to carry out sample tests to ensure that stocks exist in fact as well as on paper.

Consequently, the appropriate procedure as regards the issue of goods to production or service centres must be rigidly observed. No goods should be issued save on presentation of a standard form of requisition (see page 39), which, according to the circumstances, must be signed by a responsible official—the shop foreman or his clerk, or by a member of the planning and progress staff.

Goods which prove to have been issued surplus to requirements must be returned to Stores as soon as possible

or, if transferred to another shop, both the transferor and transferee departments must record the fact and supply a copy to the warehouse office so that the correct charge can be made to the department ultimately benefiting.

In some cases, even to-day, it is found that loose methods are tolerated with regard to the control of materials, whereas quite extraordinary care is taken with minor items of petty cash expense.

In all cases the requisitions must bear a clear indication of the shop or department requiring the goods, and of the process, job or operation on which they are to be used.

In this way the warehouse manager finds himself in the position of a banker who has paid a cheque. He has the cancelled voucher in his possession as evidence of issue, and he can tabulate the requisitions for credit, firstly, to the Stores ledger account and for debit, secondly, to the relative process or order number.

The Stores ledger itself (see page 38), either in card or loose-leaf form, must be regarded as the master record, irrespective of whether it is written up in the warehouse office or in the Cost office.

It is a running record, showing usually in quantity and value the investment in stocks in total and by individual items.

As in the case of any other ledger, the sources of information for posting are the primary memoranda, i.e. the checked advice or delivery notes, or goods received sheets; and the summaries of requisitions, transfer notes, etc., prepared at daily or weekly intervals.

Finished goods received into the warehouse, whether for general stock or in fulfilment of a specific order, must be properly identified by the job number or customer's order number. Here, too, it is of the first importance that their quality is attested by the signature of the viewer, or inspector; not otherwise should the warehouse manager be expected to accept responsibility for them.

Clearly, a separate ledger will be kept for stocks of the finished product, and so far as the warehouse is concerned, it may differ from the Stores ledger for raw materials in that quantities alone, rather than values, may be recorded. As the basis of valuation adopted by the business for finished stocks may include a charge for some or all of the factory overhead expense incurred in their manufacture, it is often desirable that the Cost office should be concerned with these factory cost values.

Deliveries of finished goods will normally be on the basis of requisitions made by the Sales office, or by the Despatch section working in conjunction with it. And it will not be overlooked that delivery to the customer may well involve packing and transport costs—whether recoverable from him or not—that are sometimes no small part of the total distribution expense.

So far as materials for Production or Service departments are concerned, an important matter is the method of pricing issues. At least four different methods may be noted—

(i) Cost price

(ii) Replacement price

(iii) Standard price

(iv) Average price.

It will be appreciated that many classes of stores are normally bought in bulk at intervals, and issued in small quantities daily or as and when required. If the purchase cost varies from time to time only slightly, the calculation of the issue price under (i) and (iv) is similarly affected.

If the purchases are being made in a generally rising market at long intervals of time, the result is that under (i) above, costs will be understated in relation to a selling price (for the finished article) quoted at a later date.

The adoption of the replacement cost basis is not only

more realistic, akin as it is to present market buying price, but places the business in the same position it would have occupied had it possessed no stock of the goods in question at the date of issue, but had covered its requirements by spot purchase.

With many commodities, particularly those in regular use, long-term contracts may be made with suppliers at an agreed price which prevails virtually as a standard price, perhaps for the whole of a given trading period, and thus the effects of short-period market fluctuation are removed.

The following example shows a Stores ledger account charging issues on the average price basis.

The particulars below show the stock as valued on January 1, and the quantities received by the Stores and the net cost of a material used in a manufacturing process:

			£	s.	d.
Jan.	1	Stock 200 lb.	10	0	0
	3	550 lb. cost	27	10	0
	18	500 do.	30	4	2
	25	900 do.	64	7	6
Feb.	4	750 do.	44	9	7

Issues from Stores were as follows:

Jan.	19	900 lb.
	27	675 lb.
Feb.	5	765 lb.
	7	225 lb.

Issues were charged out on the average price method and it is required to prepare the Stores account showing

(*a*) the price at which each issue should be charged out; and

(*b*) the stock remaining at the appropriate value.

Stores Ledger

Fo.

Material............ Location

Code .... Stores........

Normal Supplier.................. Bin..........

Maximum............

Minimum............

Received							Issued						
Date	*Deliv. Sheet*	*Quan. lb.*	*Rate*	*Value* £	s.	d.	*Date*	*Req'n No.*	*Quan. lb.*	*Rate*	*Value* £	s.	d.
Jan. 1	Stock	200	1/-	10	0	0	Jan. 19		900	1/1	48	15	0
3		550	1/-	27	10	0	27		675	1/4	45	0	0
18		500	1/2½	30	4	2	Feb. 5		765	1/3	47	16	3
25		900	1/5	64	7	6	7		225	1/3	14	1	3
Feb. 4		750	1/2¼	44	9	7	7	Stock (cost)	335	1/2¼	19	17	4
							7	Write-off			1	1	5
		2,900		176	11	3			2,900		176	11	3

In the above account the closing stock has been entered at cost i.e. the cost of the most recent purchase, which is almost certainly the same as the replacement price.

It may be desirable to "control" the Stores ledger by maintaining independently a Stores ledger total account on the following lines—

To Balance—Opening stocks		*By* Total issues, per Requisitions Summary .	
Total deliveries per Goods Received Sheets .		Sales of materials .	
Total Returns from Shops		Wastage (normal allowance) . . .	
		Balance—Closing stocks	
	——		——
	——		——

Bin Card

Code No.............

Description..................
Grade.....................
Minimum Quantity..........

	In		Out			Balance
Date	*Delivery Sheet No.*	*Quan.*	*Req'n No.*	*Quan.*		*Quan.*

Stores Requisition

(Different colour for
(i) Raw Materials,
(ii) Finished Parts,
(iii) Service Stores.)

Shop 12

No.................
Date................
Stock No. ....
Job No..............

Please Supply

Description or Code	*Quantity*	*Stores Office only*	
		Rate	*Value*

Signature.........................
(Foreman, etc.)

Received...................

Labour

Under this head particularly one of the first points to appreciate is that the cost system must be intelligently designed to allow of the fullest co-operation with the human element.

To-day it is a truism that the greater part of the essential information is that which is gathered on the floor of the factory, and to make this possible the control system has to command the ready support of the works manager and his assistants.

Always an excess of " paper work" should be avoided. The simpler the methods—especially of labour control—and the fewer the memoranda required the better.

In essence, costing considerations apart, every business management will insist on being satisfied that proper arrangements are made for

(*a*) recruiting labour of the kind required; and

(*b*) ensuring that value is received for the amount paid in wages.

As regards (*a*), it is sufficient for the moment to note that different operations may call for different grades of labour at rates of pay varying with the grade, and it would be uneconomic and possibly disastrous to carry on manufacture with an unbalanced labour force or one which involved a skilled man doing a labourer's job.

To be certain, however, that value is received for the weekly wage bill demands in the first place the devising of a common-sense routine, some aspects of which are:

(*a*) A recognition of the fact that labour may be either direct or indirect. These terms are to be preferred to productive and unproductive labour, and passing refer-

ence has already been made to the distinction between them.

(*b*) Generally speaking, a wages book or analysed payroll will be kept showing the gross earnings, deductions made, and the net amount paid in cash.

It is the figure of gross earnings which is required for costing purposes. The deductions made by the employer are in the main moneys for which the employer is a trustee, either on behalf of the State (e.g. income tax deducted under P.A.Y.E.) or on behalf of the workers themselves (e.g. Games funds, Holiday funds, etc.).

(*c*) Since the gross earnings are the key figure, the preparation of the payroll involves the use of the basic memoranda from "the floor of the factory".

This may take the form of a time sheet, a piecework ticket, or a job or operation card.

Depending on the circumstances, these original records may be written up by the worker, or by the foreman or his clerk, or the latter may only attest the accuracy of the worker's own record. No hard-and-fast rule can be laid down for every factory, and different departments in the same factory may require different methods of recording time spent and work done.

At the outset, nevertheless, it is clear that the time sheets or job cards must be of a standard type, and in a form which facilitates not only total wage computation but also the pricing of the worker's time as spent on different jobs and processes.

Further, in some circumstances, a duplicate of the job card may serve as the medium both for the payroll and as an authority for the warehouse manager to take the finished product into stock.

(*d*) It is absolutely indispensable that time spent in waiting for instructions, or for materials, or for tools,

must be separately noted and corrective measures taken immediately to avoid, if possible, any recurrence of the delay.

In no case should the cost of any work actually done be loaded with idle or waiting time. So to proceed would not only improperly inflate the cost; it would render difficult or dangerous any comparison between the costs of similar jobs done at different times.

(*e*) Common sense also demands that work which is scrapped in process and on which labour costs have been incurred shall be separately dealt with.

The facts of the case may justify laying the work aside for rectification, but on the other hand it may be decided to treat the material at once as scrap, and sell it for what it will fetch.

(*f*) Just as the cost of stores consumed must be financed out of working capital, so must equally the cost of labour; indeed, it is a more insistent demand as it accrues regularly, and earlier in point of time.

For this reason in every business—even the smallest—an adequate system of internal check should be in operation.

While cash is more easily appropriated than materials, the routine laid down must, from the commencement, seek to avoid loss by fraud or by fraudulent collusion between members of staff, by the entry of dummy names on the payroll, or the payment for work not actually carried out.

In particular the actual payment of wages, at one or more pay centres, should be the responsibility of the cashier's section of the Wages office, and never of those who have taken any part in the preparation of the payroll itself.

Lastly in this respect it must at all times be remembered that factory conditions are rarely static, even from month

to month, and thus the whole of the arrangements for labour control and wage computation should be kept under continuous review by the works management and the cost accountant alike.

Basis of Wage Payment

This is chiefly significant in the case of direct labour.

With a time rate, the basis may be a fixed weekly minimum, or a rate of so much per hour or day actually worked.

If a "clock" card is stamped at the timekeeper's office on arrival and departure, care must be taken to ensure that the time paid for is productively used.

With certain service departments, e.g. Repairs and Maintenance, a time rate may prove to be the only practicable method, and the time sheet will record the number of hours chargeable for repairs in the production departments concerned.

Wage Incentives

These represent inducements to workers to increase production by working harder without any sacrifice of quality standards.

If, after careful observation, a piece rate is set by a time study engineer, the basis of payment is a rate per unit produced, and thus the employer knows exactly what his labour cost is for any given output.

Refinements of the "straight" piecework system include efficiency bonus payments where the actual time taken by the worker is less than the normal or allowed time corresponding to the piece rate.

All or part only of the bonus may be paid to the worker, or it may be shared between members of a team in agreed proportions.

The following is an example of a job card that may be used in this connection:

Job Card

Worker's No.	*Grade*	*Date*	*Process* SHAPING.

Customer				*Order dated* *Order No.*	
Quantity		*Description*		*Time allowed*	
Rate	*Time allowed*	*Time taken*	*Extension*	*Bonus*	*Extension*

Among the best-known bonus systems is the Rowan scheme. Here the worker is paid at the basic rate for the actual time and receives as bonus a percentage addition in the proportion of time saved to time allowed.

Example

A workman whose basic rate of pay is 3s. per hour is working under the "Rowan" system of premium bonus.

In addition he receives a cost-of-living bonus of 33s. per week of 44 hours.

During a week he does the following jobs:

(i) Job "A", for which 30 hours are allowed, in 20 hours.

(ii) Job "B", for which 36 hours are allowed, in 20 hours.

During the week his waiting time amounts to 4 hours.

Calculate the workman's earnings and the amounts to be charged to each job, and to Overhead.

Institute of Cost and Works Accountants. June, 1952. Intermediate Examination.

	£ s. d.	£ s. d.
Job "A"		
20 actual hours at 3s.	3 0 0	
$\frac{\text{Time saved}}{\text{Time allowed}}$ $\frac{10}{30}$		
Bonus $33\frac{1}{3}$ per cent. of £3	1 0 0	
Proportion cost-of-living bonus $\frac{30}{66}$ of 33s.	0 15 0	
		4 15 0
Job "B"		
20 actual hours at 3s.	3 0 0	
$\frac{\text{Time saved}}{\text{Time allowed}}$ $\frac{16}{36}$		
Bonus 44·4 per cent. of £3	1 6 8	
Proportion cost-of-living bonus $\frac{36}{66}$ of 33s.	0 18 0	
		5 4 8
		9 19 8
Waiting Time (to charge to Overhead) 4 hours at 3s.		0 12 0
Total earnings		10 11 8

Note.—In the above the cost-of-living bonus, being unrelated to production or production efficiency, is charged in proportion to the allowed hours.

Wages Control Account

It may be convenient to keep total or control accounts in the cost books for the gross figures of (*a*) direct wages and (*b*) indirect wages. These accounts will be cleared by transfers to the production or service departments chargeable with the labour cost.

Alternatively, in some cases an intermediate work-in-progress total account is opened, and to this account stores issued and wages earned are debited, the latter from the direct and indirect wages accounts as above.

With the items of prime cost thus recorded, the work-in-progress is itself subsequently cleared by transfer to a finished output total account.

Period by period the only balances on the work-in-progress account will accordingly represent the prime cost to date of *un*completed jobs.

Just as in ordinary financial accounting control records govern the detail of personal ledger accounts, equally in the cost books materials and wages control accounts summarise in total the amounts so charged in detail to individual jobs.

DIRECT WAGES

	£		£
Gross totals per summaries .		Total charged to Work-in-progress per analysis sheets	
		Total charged to Fixed Asset accounts for new building .	
		Total charged to Research and Development accounts, etc.	

INDIRECT WAGES

	£		£
Gross totals per Summaries .		Totals charged to *Factory Overhead*, i.e. wages for—	
		Raw stores	
		Repairs and maintenance .	
		Internal transport, etc. .	

CHAPTER VII

OVERHEAD COSTS

WHILE this is perhaps the best-known way of describing Indirect charges as a whole, the term Oncost may also be noted as indicating something which is added to prime cost, or "cost" as it was first understood.

A broad but convenient division is:

Production overheads
Distribution overheads
Administration overheads.

It is necessary to emphasise the broad view of any such grouping since it is often undesirable—or impossible—to classify expenses in watertight compartments, e.g. one director may be responsible for supervising both production and distribution in a small business.

Two matters have to be borne in mind:

The first is to ascertain the expense arising in the factory, on the selling side, and in the offices or central administration.

All such expenses are indirect—are contributory or incidental to the main job of manufacturing or trading—and vary widely according to the type and size of business and the structure of the service or supporting facilities required.

It is important to consider each section objectively; firstly because of the tendency for overheads as a whole to increase unless subject to frequent review; secondly for the reason that the total amount involved must be looked at in relation to a fair figure for the business in its present stage of development; and thirdly to ensure that movements in

variable overhead—expense fluctuating with output or activity—are in line with what the management has a right to expect.

The second consideration is bound up with the possibility of allocating all or part of the total overhead expense to the units produced, or the individual source of income.

A great deal of attention has been given in the past to the various methods of spreading overhead. Usually the aim has been to put forward a total cost per unit which, in the first place, it is suggested will assist in fixing unit selling prices, and in the second place will make available a series of net profits per unit that ultimately reconcile with the net profits disclosed by the accounts of the business as a whole.

Business men as well as cost accountants, however, will be reluctant to attach undue importance to elaborate dissections of total expense, the accuracy of which cannot always stand up to reasoned argument and discussion.

Costing is more than bookkeeping; it is not just a question of putting every figure into what is thought to be its place as a species of arithmetical exercise.

On the one hand, the contention may be that a total cost is necessary for each unit of output to assist in judging the comparative profitability of different lines. The fallacy here lies in supposing that the business alone has it in its power to determine what selling price per unit should be, or that each and every article made should always contribute a given amount of profit to the total earned.

In one or more cases selling price might be set by the market—by outside competition; in others, where an established market exists for one commodity, an outlet may automatically be provided for spares or additional fitments, with little if any extra selling overhead.

On the other hand, for internal purposes, a very real advantage may result from the ability to ascertain—short of total cost—what cost is at successive stages. And here, by

itself, the term "cost" is inadequate in that a distinction ought to be drawn between *cost to produce* and *cost to sell.*

The primary basis of valuing a unit of finished stock in the warehouse is obviously cost to produce, and no question of selling expenses is at the moment involved.

But if a decision has to be taken as regards outlay on advertising, or in choosing this or that channel of distribution, cost to sell may be a vital factor to take into account.

At the same time it must be borne in mind that cost to produce is always a more definite and tangible item in that, added to the prime cost of materials and labour, there is included overhead expense relating specifically to production, e.g. the cost of power and repair services for plant operation, the cost of staffing the raw material stores and the works manager's office, etc.

There is thus a closer relation between production overhead and prime cost than between the latter and selling or administration overhead and, to that extent, a more logical and acceptable basis of allocation can be adopted. By this is meant, for example, that if one product is processed in a fully mechanised shop while another relies largely on craftsmanship, the burden of machine charges in the former case can be placed where it belongs.

Moreover, factory inspection salaries may be relatively much less where highly skilled labour is employed which can often be depended upon to turn out a good job for its own sake.

Although to a more limited extent, distribution overhead is sometimes capable of allocation on realistic lines. That is to say, salesmen's commissions may be at a rate which differs for different products while, as between a number of products, the cost of packing and despatch to the customer may vary quite substantially.

Therefore, if a cost is required which takes account of distribution overhead as well as production overhead, due weight can be given to the known factors or to those which

are ascertainable, and the field is narrowed for which—in the last resort—more or less arbitrary methods have to be used.

In the matter of administration expense it is virtually impossible to assign such costs to departments, much less to the products manufactured in them, and even the tolerant critic may feel moved to stress the illogical and unsatisfactory nature of some of the conventional allocation bases.

The clearest example of the difficulties that may arise is seen in those cases where the central administration operates from the business's headquarters, and is responsible for co-ordinating the activities of branch factories remote from it geographically. By far the greater part of the cost of maintaining the central organisation may have no direct connection at all with the underlying production processes, and there seems to be little advantage in loading the latter with more remote costs in a manner that cannot be convincingly defended.

From another point of view it may be a much better approach to regard administration charges as a block cost, which must be recovered out of the margin between selling price and the aggregate of earlier costs.

Again, in the smaller, self-contained business, fees paid to part-time directors and the salaries of the general secretarial staff may bear no traceable relation to the productive and distributive organisation. These expense items—and others—are part of the price that has to be paid for maintaining the business in being, launched on a given programme of activity at its present stage of development.

The foregoing notes have been written to emphasise the necessity for dealing with the difficult problem of overhead in a broad and unbiassed way. They are concerned with stressing the link between the cost system and the general economic set-up of the industry and, indeed, of the area in which the business is operating.

Thus cost accounting should become a tool of management, but if that tool is to be properly used, management must know how it has been fashioned and what kind of confidence can be put in its application to practical, everyday purposes.

It will be convenient at this point to marshal the elements of cost so that a framework can be provided to assist business management in its thinking and in its survey of the general cost structure.

Direct Charges

Materials . . . .

Wages . . . .

Prime Cost . . .

Indirect Charges

(*a*) *Factory Overhead*, e.g.

Motive power . . . . . .

Repairs and maintenance . . . .

Plant depreciation . . . . .

Raw stores—wages and upkeep . . .

Factory Cost . . .

or Cost to Produce.

(*b*) *Distribution Overhead*, e.g.

Salesmen's salaries . . . . .

Salesmen's commission . . . .

Travelling expense . . . . .

Advertising . . . . . .

Finished warehouse—wages and upkeep .

Cost to sell . . . . . .

Total . . . .

(*c*) *Administration Overhead*, e.g.

General Office salaries . . . .

Directors' fees . . . . .

Professional charges . . . . .

Apparent Total Cost . . . . .

If there were only one type of finished article, an expense analysis on the above lines could be made by reference to

the number of saleable units of output produced daily, weekly or monthly; and the information could be set out in the form of a cost sheet incorporating also comparative figures for one or more previous periods.

But in the great majority of cases the business is of the multi-product type, so that at any point beyond the prime cost stage careful consideration has to be given to the matter of overhead allocation, the clerical labour it will involve, the extent to which analysis should be taken, and the advantages that may be expected to result.

In no circumstances, however, can there be any justification for treating overheads *en bloc*, if only because the detailed figures are subject to progressive qualification the further one goes from the factory floor, while the amounts involved in separate functional or service costs would be hidden in the one total sum.

By way of general illustration the following may now be studied:

Trading and Profit and Loss Account

Year to December 31, 1952

	A	B		A	B
	£	£		£	£
Stocks . .	4,100	3,700	Sales . .	40,800	30,400
Purchases .	12,500	8,000			
Wages . .	14,000	12,000	Stocks . .	3,500	3,260
Gross Profit .	13,700	9,960			
	44,300	33,660		44,300	33,660
Factory Overhead		£	Gross Profit .	13,700	9,960
Motive power . .		2,204			
Repairs and maintenance		1,320			
Plant depreciation . .		4,000			
Raw stores . . .		750			
Distribution Overhead					
Salesmen's salaries .		2,500			13,700
Salesmen's commission .		1,424			
Travelling expense .		652			
Advertising . . .		500			
Finished warehouse .		750			
Administration Overhead					
General Office salaries .		2,000			
Directors' fees . .		400			
Professional charges .		40			
		16,540			
Net Profit . .		7,120			
		23,660			23,660

Having regard to the facts set out below, it is desired to prepare detailed unit costs for the two products, *A* and *B*, each made in a separate department of the factory.

	Products *A*	Products *B*
	£	£
(*a*) Fixed selling price	10	5
(*b*) Stock analysis:		
(Unit valuation—consistently adopted—of finished stocks)	5	3
Raw materials, January 1, 1952 . . .	1,700	1,600
Do. December 31, 1952 . . .	1,500	1,400
Finished stocks, January 1, 1952 . . .	2,400	2,100
Do. December 31, 1952 . . .	2,000	1,860

(*c*) Purchases are of raw materials only.

	Products *A*	Products *B*
(*d*) Included in Wages are		
Indirect labour	1,600	750
Foremen	1,500	750

(*e*) The Plant Register shows plant at cost in

Department A	£20,000
Do. B	£10,000
Power house	£10,000

Depreciation is provided at 10 per cent. of cost.

(*f*) As between departments A and B, the estimated power consumption of the plant is in the ratio 2 : 1.

(*g*) Repair and maintenance costs are to be divided in the ratio of the book values of the plant.

(*h*) As between *A* and *B*, the cost of the raw stores is to be divided in the ratio of raw materials use, or approximately 3 : 2.

(*i*) Sales commissions are at the same rate for products *A* and *B*.

(*j*) Advertising costs are incurred for product *A* only.

(*k*) As between *A* and *B*, the cost of the finished warehouse is to be divided in the ratio of finished units sold, or approximately 2 : 3.

Factory Overhead Allocation

	A	*B*	*Power*	*M'tce*
	£	£	£	£
Indirect labour	1,600	750	204	300
Foreman	1,500	750	—	—
Indirect material	—	—	—	1,020
Coal for power	—	—	2,000	—
Raw stores (3 : 2)	450	300	—	—
Plant depreciation	2,000	1,000	1,000	—
	5,550	2,800	3,204	1,320
Maintenance (book value of plant)	660	330	330	1,320
	6,210	3,130	3,534	
Power (consumption 2 : 1)	2,356	1,178	3,534	
Final allocation to *A* and *B*	8,566	4,308		

Distribution Overhead Allocation

	A	*B*
	£	£
Salesmen's commission (2 per cent. sales value)	816	608
Advertising	500	—
Finished warehouse (2 : 3)	300	450
	1,616	1,058
Salesmen's salaries (equally)	1,250	1,250
Travelling expense (equally)	326	326
Final allocation to A and B	3,192	2,634

Before proceeding further, it is important to realise that the facts or estimates on which the above allocations have been based will represent the agreed opinion of those best competent to judge.

The cost accountant alone cannot accept responsibility for the choice of any particular method, although he may advise—together with others—and submit draft figures for discussion.

Meanwhile, the merit of the above schedules is two-fold. They show the costs of the service departments, Power and

Maintenance, and also they indicate a reasonable basis for the absorption of these costs to the two productive departments, which are the source of profit.

Finally, it will be appreciated that the charging equally of the items of salesmen's salaries and travelling expense is no more than an arbitrary allocation. The sales staff will almost certainly be selling both products, often to the same customer, and it would be impossible to get anything like an exact spread.

Alternatively, of course, the basis of sales values might be adopted.

COST SUMMARY

Year 1952

	A				*B*			
Output.	4,000 *units*				6,000 *units*			
Direct Charges	£	£	*s.*	*d.*	£	£	*s.*	*d.*
Materials used	12,700	3	3	6	8,200	1	7	4
Wages	10,900	2	14	6	10,500	1	15	0
Prime Cost	23,600	5	18	0	18,700	3	2	4
Indirect Charges								
(*a*) Factory Overhead per schedule	8,566	2	2	10	4,308	0	14	4
Factory Cost	32,166	8	0	10	23,008	3	16	8
(*b*) Distribution Overhead	3,192	0	16	0	2,634	0	8	9
	35,358	8	16	10	25,642	4	5	5
(*c*) Administration Overhead (4% on above)	1,414	0	7	0	1,026	0	3	5
Apparent Total Cost	36,772	9	3	10	26,668	4	8	10
Apparent Net Profit		0	16	2		0	11	2
Sales Price		10	0	0		5	0	0

It will be noted that the administration overhead has been spread on the total of factory cost and distribution overhead.

No suitable alternative basis for allocating these more remote overhead charges offers itself.

In a given case it is possible that the general office staff might be required to keep time sheets for the purpose of trying to apportion their time (and thus salaries) to production (issuing purchase orders to suppliers of raw materials) and to distribution (handling orders received from customers), but it will almost certainly be found that such purchase and sales orders affect both products *A* and *B*.

So far as directors' fees and professional charges are concerned, nothing at all in the nature of a factual basis can be put forward.

Thus far, the moral illustrates itself and the pretensions of what appear to be definite *overall* unit costs can be exposed.

This position does not, however, detract from the advantage of presenting management with a general picture of the cost structure, so that they may see where the expense arises and of what it consists.

In particular, the basis of valuation for finished stocks is seen to be slightly below the computed prime cost.

CHAPTER VIII

COSTS AND OVERHEADS

Question. The cost analysis you have just carried out is for the full period of the last trading year. Would a business be content to wait so long in order to find out which of its two products was the more profitable?

Answer. In fact, no. Past costs, or historical costs as they are often termed, are open to the objection that they reflect the conditions met with in a particular period—a year or less—when trade may have been better or worse than is normally expected. And even if the past period had been one of three months only, the same criticism would apply, especially if the business done was seasonal.

Moreover, the idea of trying to recoup all overheads, as we have just attempted to do, may make the results definitely misleading. That is why our figures were described as "apparent total cost" and "apparent profit" per unit of output.

Question. Will you explain the point a little more fully?

Answer. Let us look at it in this way. If trade is bad, or if the sales market for the product is highly competitive, the share the business gets may be less than it could handle and its factory output may be restricted accordingly. There would be no point in piling up goods for stock.

Consequently, to insist on the full recovery of overhead, which, as we shall see, cannot be reduced in proportion to a reduction in output, will saddle the individual units that are made with a relatively greater overhead burden.

Unit total cost will be bigger and, if selling prices are

fixed by reference to it, the competitive position of the business will be still further weakened.

Question. You mean that unit total costs will rise or fall with changes in the level of production?

Answer. Broadly speaking, yes. If you kept output at a desirable level so that the plant was fully used, the overhead costs per unit would fall to as low a figure as you could expect.

But that kind of attitude only a really courageous management would take up; it would argue that unless sales could somehow be maintained or increased, finished stocks would be lying idle and so lock up an increasing amount of working capital, quite apart from the fact that such stocks might deteriorate or become out of date.

Question. Are there no alternative ways in which management can try to deal with the position?

Answer. You must not suppose that overheads are the only relevant factor. The prime cost factors of raw materials and direct wages should be studied to see how far, for example, cheaper but still adequate materials could be used. Inefficient supervision in the factory may mean that labour is not employed to the fullest advantage, and direct wages may be paid for time lost due to a shortage of tools or machine breakdown.

Indeed, the saving made by a ruthless paring down of overheads, particularly factory overheads, may not only be offset by retaining in use obsolete production processes; it may well serve to conceal the basic inefficiency of these processes.

Question. Doesn't all this imply that management has got to deal with the present, and possibly with the future, much more than with the past?

Answer. Yes, it implies—above all—that historical costing is much the same thing as being wise after the event, when it is too late to correct the mistakes that have already been made.

But it does not stop there. It may result in the possibility that historical total costs per unit, calculated in a period of low output, are carried forward as a basis for the next period when general trading conditions have greatly improved, and when output could reasonably be expanded to take advantage of them.

The point is that, whether or not a costing system is in operation, before manufacture can be begun there must exist some sort of plan for production and distribution, and also for financing. Someone has to take the responsibility for what is, in the first instance, a venture. The cost accountant comes into the picture by providing information week by week, or monthly, to tell management about the success or failure of their plans; and also by seeing, with the consent of management, that the information is made available to every member of staff, however junior in status, who has it in his power to influence results.

Question. Can we now go back for a moment to the question of overheads. You said that they could not necessarily be reduced in proportion to a fall in output. Will you give some examples from the different kinds of overhead?

Answer. Let us take one or two from each of the three typical expense groupings—Factory, Distribution and Administration.

Factory. The salaries of the works manager and his assistants, repairs to factory buildings, and depreciation of the plant and equipment, are all instances that come readily to mind. It is true that double-shift working puts an extra strain on the productive plant, but this can usually be taken care of by proper maintenance and the timely replacement

of worn-out parts. In the ordinary way, however, provision for depreciation is made with reference to the expected period of useful life, and not in relation to a rising or falling output per machine.

These, then, are examples of fixed expense, as opposed to variable cost such as fuel, power, light and water, and repairs to plant.

Distribution. In this case the key factor is sales rather than output, and while it is only possible to measure the expenses incurred against the actual net sales won, nevertheless the fulfilment of the long-term sales policy must not be overlooked, in that current costs may result in an increase of sales in the *next* trading period or in the consolidation of a new market for which the business is trying to cater. These benefits may be none the less real for being postponed.

It is, of course, also true that factory overhead—particularly on the research side—may confer delayed advantages and, in certain circumstances, such outlay may be temporarily capitalised until the revenue-earning stage is reached. It would be exceedingly unwise, however, to carry forward distribution overhead in a similar way.

Examples here of relatively fixed costs include the salaries of the sales office staff and of field salesmen, and the upkeep of the showroom and finished goods warehouse.

Administration. Virtually all such overhead is fixed by reference to the size of the business and the management organisation required to enable it to operate satisfactorily.

Office staff salaries, directors' fees, and depreciation written off office equipment will all remain completely unaffected by normal changes in the level of output.

At the same time it should be remembered that certain variable costs will be incurred, although these are more especially of a financial character.

For example, cash discounts allowed and the loss arising

from bad debts may be expected to vary to some extent with sales turnover. Yet these can scarcely be regarded as distribution overhead, or as expenses for which the sales department is responsible. The object of granting discount is to assist in converting a book debt into cash, and the responsibility for collection within normal credit terms is that of the general office, and not of the sales office.

Question. At the outset, then, it is a good plan to divide your overhead as a whole into fixed and variable items?

Answer. If you proceed on these lines it will help you in two directions.

Firstly, you will get an idea of what expenses are controllable by management. It is not enough merely to suggest that certain outlay should vary with output. Management's job is to see that indirect labour—in the production shops, for instance—is if possible reduced following a fall in output, and equally in such a case the consumption of purchased electric current for reduced plant operation.

These economies in overheads will not happen of themselves. In the reverse direction, if output is going up, allowance must be made for some increase in certain classes of indirect labour, and the important thing is to know within what limits it should take place.

The cost accountant can provide the data, but it is for management to use it.

Secondly, in times of bad trade or of seasonal inactivity it is worth while knowing what expenses are caused by putting in hand additional jobs or orders, that is to say, what is the relative prime cost and the total variable overhead. If a reduced selling price covers these, the new job will just pay for itself.

Question. But you have got nothing to put towards the fixed expenses; you will be out of pocket there?

Answer. No; because these expenses are going on in any event. Admittedly, no business could quote selling prices on such a basis for a long period, but it may be faced with choosing the lesser of two evils. If it insists on getting the full or normal selling price, customers' orders may not be forthcoming and so one or more departments may have to shut down. This would involve losing, perhaps permanently, the services of skilled workpeople and others.

Once again, the cost accountant can help by indicating what allowance ought to be made for variable or controllable overhead.

As a matter of business policy, management may see fit to act on the information, and can do so with its eyes open as to the effect on its profit and loss position.

Question. Are there any other matters that ought to be taken into account?

Answer. Probably these. Even if only for a brief period, the fact that you book an order at a reduced price for a "fill-up" line may do the business harm with its regular customers trading with it on normal terms.

It may spoil the market and create uncertainty about the general future level of prices.

There is also the point that it may be difficult to replace some kinds of raw material stocks on which you are drawing to carry out sales orders that are, on the face of them, unremunerative. And in recent years, at least, replenishing stocks has involved additional finance to meet rising purchase costs.

Therefore the Balance Sheet, as well as the Profit and Loss account, is affected; on the one hand as regards sales goodwill; on the other—and much more immediately—as regards the maintenance of minimum stocks at costs which you can recover in the ordinary course of business and without the necessity of a special sales effort.

Obviously, a firm dealing in branded goods selling at a

fixed price to the consumer lacks freedom of action in this respect unless it can adjust the trade discounts allowed to the stockist.

As a much more practicable step, such businesses try to maintain demand in a variety of well-known ways, including large-scale press advertising, gift schemes and the provision of an effective "after sales" service.

CHAPTER IX

OTHER METHODS OF OVERHEAD RECOVERY

In the example given in Chapter VII, a rational method of recovering overheads (i.e. one based on an examination of the facts) was outlined for the purpose of arriving at unit total costs.

In this most debatable field of cost accounting it has to be realised that accountancy methods and formulae must be applied on common-sense lines having regard to the nature of the business, the number and variety of its products and the degree of completeness with which its operating results are to be measured.

Cost of production, including as it does factory overhead expense, can be determined with greater accuracy than unit selling or administration costs.

The facilities provided by the production service departments can be more directly related to the unit of output, and it is logical that thought should be given to the underlying items of prime cost which they are incurred to support.

Providing a workman with wages and raw materials is only a beginning; he requires hand tools and machine tools, power to operate them, proper heating and lighting services, the amenities of a works canteen and the shelter afforded by the factory buildings, which must be equipped, as a minimum, with the safeguards prescribed by industrial legislation.

The close association of facilities for production which all this implies is a long way removed from what is happening in the general office or in the sales department, and if there is to be any question of allocating expenses to the various classes of goods made in the factory, there must always be a

far stronger case for dealing in this manner with factory overhead than with the much more remote items of general overhead charges affecting distribution and administration.

Recovery on the Basis of Direct Wages

The charge for the work done within the factory by the labour directly employed has often been described as "conversion cost", and the term excludes altogether the cost of the materials used.

While as between one job or process and another the cost of the materials may be completely different, it is nevertheless possible that the same grade of labour can be used throughout, and this becomes the stable factor for all prime cost calculations.

Assuming, then, that direct labour costs in each department are known and that factory overhead is broken down to shops or departments, the ratio between the two can be noted and applied as a percentage to any operation within the department for the purpose of suggesting what the overhead burden appropriate to it should be.

Thus, if the ratio between direct wages and factory overhead is say 2 : 1, it could be contended that on a job costing £10 in wages, £5 would be recovered for overhead.

More especially, if all direct labour were paid at uniform time rates, and if comparatively little machinery were used, such a percentage method might give reasonably accurate results. In many cases these conditions seldom obtain, but the simplicity of the method has earned for it wide popularity, enabling, as it does, shop or departmental overhead to be treated *en bloc*.

Two points have, however, to be made.

In the first place, because of the fixity of certain overhead costs, the percentage rates adopted have to be kept under constant review and, if need be, promptly adjusted to take care of rising or falling output.

Secondly, the method is generally unsuitable to the spreading of distribution and administration overhead. The fact that a particular job has a high labour cost content is, of itself, obviously no argument for loading it with a proportionately high amount of selling costs or of general office expense. And it will be appreciated, too, that while factory charges can be analysed departmentally it is rarely possible to analyse these latter costs in anything like the same way.

To this extent the case is made the stronger for drawing a line at the ascertainment of factory cost of production, and leaving it at that.

Recovery on the Basis of Time

One of the weak features of the direct wages method is that it does not allow for the effect of varying rates of pay, while it also disregards the fact that the wages element of prime cost does not necessarily reflect the real demand made by a job on the services represented by factory overhead.

To take two examples only, factory supervision salaries —as distinct from direct wages—accrue on a time basis as does, in the long run, the depreciation written off plant and tools over their effective working life.

In many cases, therefore, a juster appraisal of the position would indicate that overhead should be allocated in relation to the *time* during which the job or process has had the benefit of these services.

Both on time sheets and on job tickets the time spent may be recorded for direct wage calculation in the first place, and subsequently a rate per hour for overhead absorption may be applied which will suitably recover the relevant overhead.

The term "man-hour rate" is often used where an hourly rate of charge is fixed for each employee. In order to compute it the overhead is analysed to departments and, within

the departments (if practicable), to cost centres or particular operations.

This procedure will involve distinguishing between fixed expense (e.g. rates, heat, light, insurance, etc.) and variable or special expense (power, plant repairs, process supplies, etc.).

This method of recovery is suitable where both high and low price direct labour are concerned, or if production is chiefly by highly skilled hand labour in which machinery only plays a minor part.

Example

Man-hour Rate Computation

Period ended....................	£	s.	d.
Rent, rates, etc.	40	0	0
Light	7	10	0
Heat	5	0	0
Supervision	26	0	0
Oil, tallow, waste, etc.	5	10	0
Total Fixed Expense	84	0	0

	s.	d.
Expected working hours for period, 840.		
Hourly rate for fixed expense, 2s.		
Hourly rate for tool depreciation	0	6
Power charge	0	9
Fixed expense rate, as above	2	0
Total Man-hour Rate	3	3

Specimen	£	s.	d.
Direct wages—10 hours at 3s.	1	10	0
Materials used	4	10	0
Prime Cost	6	0	0
Factory overhead—10 hours at 3s. 3d., above	1	12	6
Factory Cost	7	12	6

Machine-hour Rates

These rates are fixed in respect of each machine or batch of machines to recover factory overhead where the shops

are largely mechanised, and particularly where expensive plant is operated by female or boy labour.

In such a case the significant element in production is the machine rather than the operator, and sometimes the operator's wage may itself form part of the machine rate.

It is again convenient to divide the total relevant overhead into fixed expense and special items.

Example

A factory operates for 50 weeks a year. For the other two weeks all workers are on holiday at full pay, and also receive a bonus of one week's pay. The working week is 44 hours.

Two foremen are employed in the machine shop, and each is paid £15 per week. There are 28 operators in the shop.

In the entire factory there are 210 employees.

The power rating of electric motors driving machines in the machine shop is 120.

It is required to compute (to the nearest penny) a machine-hour rate for a machine tool from the following details:

(*a*) The tool is operated by a mechanic who is paid £10 per week and a cost-of-living bonus of £2, 10s.

(*b*) There is an assistant whose wage is £2, 10s. per week and a cost-of-living bonus of £1.

(*c*) The power consumption of the machine shop is £8, 10s. weekly.

(*d*) Repairs and upkeep of the tool cost £180 a year.

(*e*) The purchase cost of the tool was £2,000. Its estimated working life is 17,250 hours, and the probable scrap value is £275.

(*f*) Apart from the wages of the foremen, the machine shop overheads are £7,000 a year.

(*g*) Administration overheads of the entire factory are £15,000 a year, and are allocated on the basis of the number of employees.

(*h*) The power rating of the motor driving the tool is 5.

Computation

Machine No. . . . .

2,200 *working hours per year of* 50 *weeks*

	1	2	Total		Per Hour
Fixed Expense					
Operators' Wages	£ s. d.	£ s. d.	£	£	s. d.
Basic	10 0 0	2 10 0			
Cost-of-living bonus	2 10 0	1 0 0			
	12 10 0	3 10 0	16		
for 53 weeks				848	7 8
Factory Overhead			7,000		
Wages of foremen, £30 for 53 weeks			1,590		
Total for 28 *operators*			8,590		
Two such				614	5 6
Administration Overhead			15,000		
Proportion applicable to 2 out of 210 employees				143	1 3
Total Fixed Expense					14 5

	s. d.	Per Hour s. d.
Special Expense		
Power. Ratio 5 : 120 of (per week) £8, 10s.	7 1	
and per hour		0 2
Repairs and Upkeep. £180 divided by 2,200 hours		1 8
Depreciation £1,725 divided by 17,250 hours		2 0
Total Machine-hour Rate		18 3

Note.—In this example it has been found possible to absorb administration overhead on the basis of the total number of employees. It does not necessarily follow that this is the best or the only method of allocating such expense.

Sometimes, however, canteen and welfare costs are dealt with on the basis of the total numbers capable of benefiting.

1.

The following is an extract from the stores bin card relating to Commodity *X*:

	Units		Units
Jan. 1. In hand	10,000	Jan. 16. Returned to suppliers	1,000
15. Received into store	25,000	22. Withdrawn from store for sale	720
		27. Destroyed by fire	400
		31. Issues to production during the month	24,000
		31. Wastage	600
		31. In hand	8,280
	35,000		35,000

Stores in hand and received into store are taken into the Stores Accounts at 10s. per unit. The stores withdrawn for sale were sold to an associated firm at 12s. 6d. per unit. Issues to production are charged at 10s. 2d. per unit to cover normal wastage. The cost of wastage not covered by this inflated charge is to be written off to Works Expenses Account. The stores wasted realised a scrap value of £50.

Write up the Stores Ledger Account for Commodity *X* for the month of January.

Society of Incorporated Accountants and Auditors. May, 1952. Intermediate Examination.

2.

Outline three methods of distributing overhead expense to products, and indicate the main practical considerations influencing the choice of each one.

Institute of Cost and Works Accountants. June, 1951. Intermediate Examination.

3.

Upon what basis would you allocate the following expenses to individual cost centres in a general engineering works:

(*a*) Rates;
(*b*) Power;
(*c*) Shop supervision;
(*d*) Lighting;
(*e*) Fire insurance;
(*f*) Depreciation of plant and machinery;
(*g*) Repairs to the fabric of the works buildings?

Institute of Cost and Works Accountants. June, 1951. Intermediate Examination.

4.

From the following figures calculate the

(1) cost of material used;
(2) cost of output of manufactured goods;
(3) percentage of Gross Profit on Sales.

Trading Account

	£	£		£	£
Stocks:			Sales		75,000
Raw Materials	4,000		Stocks:		
Finished Goods	3,500		Raw Materials	6,000	
		7,500	Finished Goods	2,500	
Purchases		25,000			8,500
Wages		35,000			
Carriage		1,375			
Gross Profit		14,625			
		83,500			83,500

Society of Incorporated Accountants and Auditors. May, 1951. Intermediate Examination.

5.

Prepare a Cost Sheet for Red Brickworks, Ltd., for the four weeks to October 28, 1951, showing cost and profit per 1,000 bricks, from the following information:

Labour—Brickmaking, £3,100
Digging, £800.

Materials used—Lime, 1,360 tons at 82s. per ton.
Coal, 1,240 tons at 46s. per ton.
Sand, 1s. 3d. per 1,000 bricks made.

Stores used, £922.

Factory Oncost, 30 per cent. of direct charges.

Office Oncost, 12½ per cent. of Factory Cost.

Stocks—at commencement, 250,000 bricks.
at end, 850,000 bricks.

Sales, 5,000,000 at 81s. 3d. per 1,000.

Society of Incorporated Accountants and Auditors.
November, 1951. Intermediate Examination.

6.

The following figures are extracted from the books of Lollipops Ltd. for the year to December 31, 1950:

	Stocks Dec. 1949	*Purchases for year*	*Stocks Dec.* 1950
	£	£	£
Sugar and Glucose	1,360	7,034	1,620
Milk and Fats	620	5,300	580
Essences and Flavours	40	480	80
Containers and Wrapping	1,840	9,300	1,680
Finished Goods	1,200	—	1,400

	£
Wages and National Insurance Contributions:	
Direct	3,680
Factory supervision	800
Machinery maintenance	700
Depreciation—Machinery	60
Buildings (⅝ Factory, ⅜ Office)	72
Directors' Remuneration (£750 should be included in factory cost)	2,400
Rates and Insurance (⅞ Factory, ⅛ Office)	120
Heating and Lighting—Factory	75
Offices	24

	£
Power	350
Office Expenses	180
Motor Expenses—Factory	224
Travellers	1,450
Office Salaries	650
Professional Charges	50
Canteen Loss ($\frac{8}{10}$ chargeable to the factory)	60
Cash Discounts, allowed to debtors	760
Travellers' salaries and commission	1,400
Sales	42,375

The provision for doubtful debts is to be increased by a sum representing ½ per cent. of Sales.

Tonnage of Sweets produced . . . . 130 tons

You are required to prepare Manufacturing, Trading and Profit and Loss Accounts for the year to December 31, 1950, which will help your clients to appreciate the cost of manufacturing a ton of sweets.

Institute of Chartered Accountants. May, 1951. Intermediate Examination.

7.

The following particulars for 1949 are taken from the books and records of Alluse Ltd., which manufactures and sells a proprietary mixture:

	lb.	£
Stock, January 1, 1949:		
Raw material	2,000	200
Finished mixture	500	175
Factory stores		725
Purchases:		
Raw material	160,000	18,000
Factory stores		2,425
Sales:		
Finished mixture	153,050	91,800
Scrap (Factory)		817
Factory wages		17,865
Power		3,040
Machine depreciation		1,800
Salaries:		
Factory		7,222
Selling		4,150
Office		3,722
Expenses:		
Direct		1,850
Selling		1,800
Office		1,820

	lb.	£
Interest on Capital:		
Factory		700
General		300
Advertising		14,000
Cash discounts on sales		1,450
Bank Interest paid		125
Stock, December 31, 1949:		
Raw material	1,200	—
Finished mixture	450	—
Factory stores		555

The wastage in raw material is normal.

Finished mixture in stock at the end of the year is to be valued at Factory Cost.

The purchase price of raw material remained unchanged throughout 1949.

Raw material is used and finished mixture is sold on the "First in, First out" basis.

From the above information you are required to prepare a Cost Statement of Alluse Ltd. for 1949.

Institute of Chartered Accountants. November, 1950. Intermediate Examination.

8.

Prepare a computation of a machine-hour rate for machine No. 101 for a four-week period from the following information:

	£	s.	d.
Annual rent of space occupied	39	0	0
Annual rates of space occupied	26	0	0
Annual lighting attributed to machine	13	0	0
Annual heating attributed to machine	19	10	0
Sundry expenses for one year attributed to machine	26	0	0

The machine cost £540 and is deemed to have a scrap value of £40 at the end of its effective life of 15,000 running hours. It is estimated that the total expenditure in respect of repairs during the effective life of the machine is £170.

The machine consumes 8 units of electrical power per hour obtained at a cost of 1½d. per unit.

The machine runs normally for 1,500 hours per annum.

but owing to shortage of work it is estimated that for the present year it will only run for 1,000 hours.

Institute of Cost and Works Accountants. December, 1952.
Final Examination.

9.

A factory manufactures two different types of pencil, one round and the other oval. The following figures relate to output and costs for the month of August, 1942:

	Round			*Oval*		
Pencils produced, dozens	12,000			2,400		
Direct Factory Cost:	£	s.	d.	£	s.	d.
Materials	101	10	0	21	4	0
Wages	366	10	0	98	14	0
Rent, Power, Heat, etc.	90	0	0	19	12	0
	558	0	0	139	10	0
Costs not directly apportioned:						
Factory Supervision and Sundries				140	0	0
Packing Department, Wages				19	4	0
Do. Rent, Heating, etc.				9	0	0
Selling and Management Expenses				186	12	0

Factory supervision and sundries are allocated in proportion to the direct factory cost. Selling and management expenses and packing department expenses are treated as being the same for each type of pencil. Both types are packed in cartons of a dozen costing 9s. 6d. per 100 cartons.

Prepare a cost statement showing the cost of each type of pencil per dozen, packed. (All figures to be shown in pence and decimals to two places.)

Institute of Chartered Accountants. August, 1942.
Intermediate Examination.

10.

You are required to prepare a schedule showing the allocation of overheads between three departments of a factory, viz. A, B and C. The expenses for the year to June 30, 1951, as shown by the financial accounts, were as follows:

	£		£
Electric light . . .	250	Depreciation of plant .	300
Electric power . . .	640	Material handling charges .	500
Heating	300	Rent and rates . .	750
Insurance of plant . .	64	Plant repairs and maintenance	256
Accident insurance . .	140		

You also obtain the following information:

	Dept. A	*Dept. B*	*Dept. C*
Direct wages	£2,400	£1,600	£3,000
Floor space	30%	20%	50%
Number of direct operatives . . .	10	8	17
Material used	£2,000	£2,000	£4,000
Value of plant	£1,000	£500	£1,500
Number of machines	10	6	16

Calculate the departmental overheads as a percentage of Direct Labour, and show the basis of your allocation for each item of expenditure.

Institute of Cost and Works Accountants. December, 1951.
Intermediate Examination.

11.

Present the form of a schedule which sets out the items making up departmental expenses and provides for their allocation to five production and five service departments. The latter are closed to the production departments. (Detailed figures not required.)

Direct Labour in production departments=£6,000, £5,000, £25,000, £7,000 and £8,000 respectively.

Number of Direct Labour Hours=48,000, 37,500, 200,000, 60,000 and 50,000.

Total Production Departmental Expenses (after allocation of service department expenses)=£8,698, £3,640, £14,625, £2,694 and £3,383.

Calculate the Direct Labour Rate and the Labour Hourly Rate, incorporating the figures on the schedule.

Institute of Cost and Works Accountants. June, 1951.
Intermediate Examination.

CHAPTER X

THE COST BOOKS RECONCILED

Now that an understanding has been got of the general cost structure, some attention can be given to the formal records for which the cost accountant will be responsible.

In this chapter it is only proposed to consider the position which arises where, in addition to the usual financial books of account, a complete double-entry system of cost book-keeping is maintained.

Subject to the qualification that the cost books as such are restricted to dealing with items of income and expenditure (and most often to items of expenditure only), their function is to assist in analysing the various kinds of outlay to the units produced, and to do so in the sequence of operations, i.e. from raw materials to work-in-progress and thence to the finished product.

In the ordinary way, impersonal accounts in the financial books are closed off periodically to a summarised revenue account and there is normally little, if any, scope at all in the framework of the latter to provide detailed information concerning individual jobs or processes. All that is done is to give an overall picture, culminating in a figure of net profit or loss for the period in question.

But if a plan of cost records, or works records—for such they are—can be devised to show in as much detail as desired the cumulative build-up of expense relating to specific units of output, and at the same time bring out prominently the total or control figures of labour and material costs, and of overheads, then in such circumstances the cost accountant is in a position to satisfy at least two important requirements.

He has at his disposal adequate data on which to base helpful reports to management. He is also able to accept from the secretary or financial accountant total figures of expenditure, and allocate them to conform to the costing pattern which the business has found most suitable.

In the nature of things, any process of allocation and re-allocation of expenditure makes it imperative that sight is never lost of the original facts and figures from which the allocations stem.

For this reason there is much to be said for the discipline imposed by the adoption of the double-entry system, since the figures can be ultimately reconciled with the financial books, however much they have been regrouped or dissected, e.g. a number of impersonal ledger accounts may be combined to give a total for factory overhead.

The principle of total or control accounts is one familiar to many business people where it is a question of imposing a check on the accuracy of personal ledger accounts and accounts with branch establishments. In general, the idea is that the totals of books of prime entry may be brought together to show the balances arising from numerous related transactions, and to show them without recourse to the underlying detail, thereby facilitating the preparation of interim revenue accounts and balance sheets. Extending this principle to the keeping of independent cost books, the link between these and the financial books of account can be established by a memorandum control account which, from the financial accounting angle, can be styled a "Works control" or a "Cost control" account, and which has its counterpart in the separate cost books as a "Head Office control" account.

The control itself then becomes a species of capital account, reflecting at the commencing date the amount of working capital—stocks of raw material, work-in-progress and finished goods—for which the particular factory or department is answerable to its Head Office.

To project the matter further, while total accounts for such current assets may appear in the usual way in the Private or Nominal ledger, the cost accountant in his own records will first credit Head Office control with the corresponding amounts, and then debit accounts that are themselves total accounts for the values represented. For example, he will debit a stores total account which governs accounts for each class of stores—the latter being kept perhaps in card or loose-leaf form. A similar function will be served by the work-in-progress and finished stocks total accounts, and it is to be expected that if the cost books are written up to date, the aggregate balances on the individual accounts will—subject to leakage, etc.—agree with the balance on the relative total account.

Monthly or quarterly the Cost office will then accept debits from the Accounts department for materials purchased, wages paid and expenses incurred, crediting the Head Office control with these totals and debiting the amounts to the accounts concerned.

The latter will then be cleared by crediting them with the totals of the periodic summaries of stores, etc., withdrawn by requisition, and the totals of wages analyses relating to specific jobs or processes.

In this connection, a convenient practice is to post the totals of stores, wages, etc., to the debit of a work-in-progress total account, itself governing the various processes or jobs on hand in the factory.

In sequence, and from time to time, the cost of the whole of the completed work will be credited to work-in-progress total account and debited to a finished stock control, the latter of course incorporating such finished stock balances as may outstand at the start and finish of the period.

Unless the Cost office is required to prepare a "Costing Profit and Loss" account based on the information at its disposal, the finished stock control—once more in sequence —will be credited with the ascertained cost of deliveries

to customers, and Head Office account debited therewith.

To this extent the factory (and the Cost office) discharge their responsibility for the values originally made available to them, and, looking at the matter from the Head Office point of view, the addition of the profit element enables its sales account to be credited and the customer's personal account debited.

All this is in step with normal double-entry principles, but it is much more than a question of accounting for total expenditures of whatever kind—wages, materials or overhead. If there is a recognised unit of output, that is to say, a job, a process or a given batch of articles, the cost or record card of the job or other unit can be built up by posting the DETAIL items that appear in TOTAL in the Cost ledger control account.

Carrying the matter to its logical conclusion, it should be possible for the cost accountant to extract at regular intervals a Trial Balance of his Cost or Works ledger and, if this is done, there is apparent proof of the accuracy with which all expenditures incurred have been taken on charge and absorbed by allocation to the total factory output.

Example

The following balances appear in a firm's Cost ledger on January 1, 195–:

	£
Work-in-progress	7,416
Finished goods	2,009
Cost ledger control	12,607
Stores ledger control	3,181
Consumable tools	1

Balances arising in the year 195– were:

	£
Purchases—Stores	17,412
Do. Consumable tools	6,431
Wages—Direct	45,000
Do. Indirect	13,698
Stores issued	18,502
Works expenses	6,315
Administrative expenses	3,200

	£
Selling expenses	2,568
Royalties on sales	1,250
Sales	100,000
Works expenses recovered	12,621
Administrative expenses recovered	7,780
Selling expenses recovered	6,200

At the end of 195– stocks were valued as under:

	£
Finished goods	4,200
Stores	2,110
Work-in-progress	3,400

It may be assumed that consumable tools purchased are written off in the year of purchase, and that indirect wages are allocated between works, administrative and selling expenses in the ratio 3 : 2 : 1.

Institute of Chartered Accountants. November, 1948.
Intermediate Examination (adapted).

The information given enables the total accounts to be opened and written up for the year, a summarised Costing Profit and Loss Account to be prepared, and a closing Trial Balance of the Cost ledger to be extracted.

COST LEDGER CONTROL

	£		£
Sales . . .	100,000	Opening balance .	12,607
		Stores—Purchases .	17,412
Closing balance . .	9,711	Tools— Do. . .	6,431
		Direct wages . .	45,000
		Indirect wages . .	13,698
		Works expenses . .	6,315
		Administrative expenses	3,200
		Selling expenses . .	2,568
		Royalties on sales .	1,250
		Balance per Costing Profit & Loss Account	1,230
	109,711		109,711
		Balance down . .	9,711

Stores Ledger Control

	£		£
Opening balance .	3,181	Work-in-progress—Issues	18,502
Purchases per Control	17,412		
Transfer to Costing Profit & Loss A/c . .	19	Closing balance . .	2,110
	20,612		20,612
Balance down . .	2,110		

Consumable Tools

	£		£
Opening balance .	1	Work-in-progress .	6,431
Purchases per Control	6,431	Closing balance . .	1
	6,432		6,432
Balance down . .	1		

Direct Wages

	£		£
Amount per Control .	45,000	Transfer to Work-in-progress . . .	45,000

Indirect Wages

	£		£
Amount per Control .	13,698	Transfer to:	
		Works expenses one-half	6,849
		Admin. do. one-third	4,566
		Sales do. one-sixth	2,283
	13,698		13,698

Works Expenses

	£		£
Amount per Control .	6,315	Transfer to Work-in-progress . . .	12,621
Transfer from Ind. wages	6,849	Under-absorption to Costing Profit & Loss A/c	543
	13,164		13,164

Administrative Expenses

	£		£
Amount per Control .	3,200	Transfer to Costing Profit & Loss A/c . .	7,780
Transfer from Ind. wages	4,566		
Over-absorption to Costing Profit & Loss A/c .	14		
	7,780		7,780

Selling Expenses

	£		£
Amount per Control .	2,568	Transfer to Costing Profit & Loss A/c . .	6,200
Transfer from:			
Ind. wages . .	2,283		
Royalties on sales .	1,250		
Over-absorption to Costing Profit & Loss A/c	99		
	6,200		6,200

ROYALTIES ON SALES

	£		£
Amount per Control .	1,250	Transfer to Selling expenses	1,250

WORK-IN-PROGRESS

	£		£
Opening balance .	7,416	Transfer to Finished Goods	86,570
Transfers from :			
Stores . . .	18,502	Balance down . .	3,400
Consumable tools .	6,431		
Direct wages . .	45,000		
Works expenses .	12,621		
	89,970		89,970
Balance down . .	3,400		

FINISHED GOODS

	£		£
Opening balance .	2,009	Transfer to Costing Profit & Loss A/c . .	84,379
Transfer from Work-in progress . .	86,570	Balance down . .	4,200
	88,579		88,579
Balance down . .	4,200		

SALES

	£		£
Transfer to Costing Profit & Loss A/c .	100,000	Amount per Control .	100,000

Costing Profit and Loss Account

	£			£
Factory cost of finished goods sold . .	84,379	Sales		100,000
Administrative expense recovered . .	7,780			
Selling expense recovered	6,200			
Balance down . .	1,641			
	100,000			100,000
		Balance down . .		1,641
Under-absorption:		*Over-absorptions:*	£	
Works expense .	543	Stores . .	19	
Net Profit . . .	1,230	Admin. expense	14	
		Selling do.	99	
				132
	1,773			1,773

Closing Trial Balance

	Dr. £	Cr. £
Cost ledger Control		9,711
Stores ledger Control	2,110	
Consumable tools	1	
Work-in-progress	3,400	
Finished goods	4,200	
	9,711	9,711

In the foregoing illustration it will be observed that balances arise in respect of under or over absorption of operating expenses and that these have been taken, below the line, to the Costing Profit and Loss Account.

During the year under review allowance will doubtless have been made for recovery of the various kinds of overhead expense, either on the basis of what is believed to be a fair allocation, or perhaps on the basis of the actual proportions of the *previous* trading period.

For example, if in the previous year the total works expense was 28 per cent. of (say) direct wages, this percentage might have been adopted for the current period in the belief that it would suffice for the purpose of charging current output with the correct current factory overhead.

In fact, however, the current percentage is a little over 29, indicating, *inter alia*, either that works expense has slightly increased in amount, or that the volume of work done (reflected in direct wages paid) is a little less than in the previous year.

The separate statement, below the line, of these variations calls attention to them as factors responsible for the ultimate net profit proving less than was expected, and prompts management to review the adequacy of the methods adopted for overhead cost recovery as a whole.

Finally, the opportunity of reconciling the results shown by the Costing Profit and Loss Account with those of the Profit and Loss Account prepared from the financial books may be affected by other considerations, including

(*a*) the adoption in the financial books of a different basis for valuing stores and finished stocks, e.g. market value at the Balance Sheet date instead of cost;

(*b*) the creation in the financial books of reserves and provisions about which the cost accountant is not informed.

1.

The following balances were extracted from the Cost ledger of Alluse Ltd. as on January 1, 1951:

	£
Work-in-progress	5,000
Finished goods	2,000
Stores	3,600

Transactions during the year were:	£
Stores purchased	21,000
Wages, Productive	60,000
Do. Unproductive	18,000
Stores issued	22,000
Works expenses	12,000
Administrative expenses	8,000
Works expenses recovered	19,500
Administrative expenses recovered	15,200
Sales	130.000

On December 31, 1951, stocks were valued as follows:

Work-in-progress	7,350
Finished goods	4,200
Stores	2,900

Unproductive wages are allocated equally between Works and Administrative expenses.

You are required to write up the appropriate accounts in the Cost ledger of Alluse Ltd. and to prepare a Trial Balance as on December 31, 1951.

Institute of Chartered Accountants. November, 1952. Intermediate Examination.

2.

A Building Contractor maintains a double-entry job-costing system.

At June 1, 1952, the Job Ledger Trial Balance showed:

Jobs in progress:	£	£
No. 101	1,920	
102	420	
Materials in stores	1,200	
Job Ledger Control Account		3,540
	3,540	3,540

His operations during June included:

	£
Materials purchased	2,350
Total wages paid	2,500
Direct expenses	340
Office and other expenses	288
Jobs charged to customers:	
No. 101	2,500
102	1,500
104	1,500

The amounts chargeable to jobs that were in progress during the month were:

Job No.	*Direct Labour*	*Materials*	*Direct Expenses*
	£	£	£
101	190	90	20
102	400	180	90
103	1,100	1,400	170
104	600	800	50
105	50	100	10

A physical stocktaking of the material in stores at the end of the month totals £960.

Office and *all* other indirect expenses are charged to jobs at the end of each month in proportion to the direct labour charged during the month.

You are required:

(*a*) to write up the Job Ledger Accounts to record the foregoing transactions;

(*b*) to prepare a Job Trading Account for the month; and

(*c*) to extract a Trial Balance at June 30, 1952.

Society of Incorporated Accountants and Auditors. November, 1952. Intermediate Examination.

3.

The following is the Trading and Profit and Loss Account of Alluse Ltd. for the year ended December

31, 1947. The Company manufactures one standard product.

	£		£
To Opening Stock of finished goods, Jan. 1 (100 units) . .	1,500	*By* Sales (10,000 Units)	160,000
Direct material consumed . . .	55,400	Closing Stock of finished goods (140 U.)	2,200
Carriage in . .	1,705	Work-in-progress .	748
Mfg. wages . .	72,700		
Gross Profit carried down . . .	31,643		
	162,948		162,948
To Works salaries . .	5,075	*By* Gross Profit brought down . . .	31,643
Office salaries . .	2,620	Rent receivable .	400
Power . . .	2,000	Transfer fees . .	14
Works light and heat	500	Cash discounts .	280
Office . . .	100	Net loss . .	2,888
Works rent and rates	1,940		
Water . . .	80		
Works consumable stores	3,995		
Apprenticeship expenses	75		
Establishment charges (office rent, etc.) .	1,937		
Administration expenses	2,700		
Directors' fees . .	1,000		
Travellers' expenses .	850		
Debenture interest .	500		
Selling and distribution exps.	4,700		
Insurance (works £500, office £80, showroom £20) . .	600		
Experimental and research . . .	750		
Holidays with pay:			
Works . . .	2,110		
Staff . . .	480		
Audit and accountancy	500		
Repairs to plant and machinery . .	1,650		
Bank charges . .	63		
Royalties payable .	1,000		
	35,225		35,225

The following information is extracted from the Cost Accounts:

(1) The net profit for the year as shown by the Cost of Sales Account was £1,475.

(2) Production has been charged with oncost as follows: Works £1, 10s. 0d., Office £1, 0s. 0d. per unit produced.

(3) Selling oncost has been charged to Cost of Sales Account at 10s. per unit sold.

(4) Royalties Payable apply to Sales.

(5) Rent Receivable is in respect of part of the offices.

(6) Work-in-progress is valued at Prime Cost plus 10 per cent.

Alluse Ltd. reconcile their Financial and Cost Accounts at the end of each year. They keep their Oncost Accounts in three subdivisions, dealing respectively with Works, Office and Selling Expenses.

Depreciation is to be ignored.

You are required to show by means of the Oncost Accounts and of a memorandum Reconciliation Account, how the reconciliation would be effected in respect of 1947.

Institute of Chartered Accountants. May, 1948.
Intermediate Examination.

CHAPTER XI

SOME COST PROBLEMS

(*a*) Contract Costs.
(*b*) Process Costs.
(*c*) Cost and Selling Price.

(*a*) Contract Costs

In many businesses the unit of output may be so large as to justify assembling directly in the financial books the costs incurred in its manufacture. The completion of the work may extend over more than one trading period, and may sometimes occupy the whole of the resources of the contractor. Shipbuilding, house building and heavy engineering provide examples of this kind of production.

To that extent the Impersonal ledger, instead of recording sales, purchases and wages accounts in the ordinary way, may take the form of a separate account for each job, debiting to it the outlay and crediting it with the contract price.

Thus each account shows the resulting profit or loss, and the total earnings of the business can be analysed to their source.

The assumption is that a proper system of expense booking exists, whether the materials used are requisitioned from stores or delivered direct to the site, and whether the firm relies on its own labour or employs sub-contractors.

From the point of view of effective internal control, proper measures have to be applied particularly where land is being developed or buildings erected on sites remote from headquarters.

In the absence of the continuous supervision which can

be exercised where the work is done under the factory roof, safeguards must exist to ensure that all items of cost are duly authorised and conform to the specification laid down.

There must be no evident opportunity for the misappropriation of cash or materials and the quality of the workmanship must be such that, so far as is humanly possible, no question arises of the customer's invoking a penalty clause.

The main thing is that there shall be a sense of discretion and a proper delegation of authority to the foreman on the job. While the materials required will be delivered to the contract site, all orders in respect of them should be issued by Head Office in the light of the preliminary estimates made, and from time to time the foreman will submit schedules of actual deliveries to enable the suppliers' invoices to be checked.

It is also essential to arrange for periodic surveys by a responsible executive so that the progress of the work appears to be in line with the quantity of materials consumed. Especially is this the case where casual labour, or labour recruited locally, is employed; and, where practicable, steps may be taken for a respresentative of the firm to attend, at irregular intervals, on the day when wages are normally paid.

A further consideration that arises is the extent to which credit may be taken for profit on uncompleted contracts.

The necessity for preparing annual accounts and the desire to stabilise profits (and dividends) year by year justifies a careful review of the position where large-scale contract work is undertaken.

Nevertheless, full provision must be made for contingencies, and in no case should profit be anticipated before all the factors affecting outlay yet to be incurred have been estimated as accurately as possible.

Apart from the taxation aspect, it is wise to take into account only a proportion of the apparent profit earned

to date, and to relate this amount to the cash so far received from the customer on the basis of architects' or valuers' certificates.

Example

The following particulars are extracted on December 31 from the books of a firm in respect of an estate contract:

	£
Direct materials issued	9,000
Do. labour	7,600
Sundry direct charges	240
Overhead charges allocated	480
Materials returned to store	100

On December 31, £200 had accrued due for direct labour, and the materials on the site were valued at £140.

The book value of the plant, etc., in use was £1600, and $12\frac{1}{2}$ per cent. depreciation is to be written off.

Approximately three-quarters of the work has been done, and up to November 30 this had been certified at £21,000. Work done since certification is estimated at £800.

The contract price is £28,000, and the customer has so far paid £20,000 on account.

A statement is required of the position of affairs at December 31, both as regards the contract account and the firm's Balance Sheet on that date.

Contract No.........

	£		£	£
Direct materials issued	9,000	Direct materials returned		100
Do. labour	7,600			
Plant, etc.	1,600	Balances c/d	£	
Direct charges	240	Stock of materials	140	
Overhead allocation	480	Plant, etc.	1,400	
				1,540
Provision for wages due	200			
				1,640
	19,120	Work-in-progress c/d at cost, including proportion of profit		20,223
Transfer to Profit and Loss Account (*below*)	2,743			
	21,863			21,863

Profit Computation

	£
Debits per contract account	19,120
less credits per contract account	1,640
	17,480
less cost of work uncertified	800
	16,680
Work certified	21,000
Profit to date	4,320
Proportion (say two-thirds)	2,880
Final proportion, based on ratio of cash received to work certified, i.e.	
$\frac{20000}{21000}$ of £2,880 (*above*)	2,743

Balance Sheet Extract

	£		£	£
Profit & Loss Account	2,743	*Fixed asset*		
Wages accrued due	200	Plant, etc., *less* depreciation		1,400
		Current assets		
		Stock of materials		140
		Work-in-progress at cost, including proportion of profit	20,223	
		Less cash received on account	20,000	
				223

(*b*) Process Costs

Where there are a number of operations in sequence, it is desirable to arrange the cost records so as to ascertain the separate costs of each.

If the processes represent a definite cost centre to which responsibility can attach, and if each is an integral part of

the normal production plan, it is important to be able to compare, period by period, the outlay incurred at each stage and the efficiency with which the work is being done.

The product of one process can be regarded as the raw material of the next, the whole of the output being transferred in a partly finished state. Generally speaking, there is no question of intermediate or process sales as such, except perhaps in the case of by-products which are either separately processed or sold in their existing condition.

Examples of industries to which process costing is applicable include branches of the textile industry, and the manufacture of proprietary food and chemical products.

Adjustments may have to be made, however, where the internal or transfer price between the processes themselves is made on a basis other than that of the recorded cost. That is to say, instead of the whole of the eventual manufacturing profit arising only at the final stage it may be preferred, for reasons of policy, to apportion the total to the various operations.

In this way credit may fairly be taken for interest on the capital employed in the section concerned, especially where one or more processes are handled by a separate branch or subsidiary company.

But in this event, and for the purpose of the annual accounts, the book value of the stocks of the finished product and of any earlier process stocks must be amended to remove the added profit. Otherwise the stock figures would be overstated, and there would be no basis for a comparison between cost and market value. Adjustments of this kind can best be made by opening, at the end of the period, a provision account for the amount involved.

Example

Cam, Curry and Carfax are in partnership as manufacturers of a chemical product which passes through three consecutive processes.

In the first process the raw materials are broken down and blended. Heat treatment and further blending are carried out in the second process, and the final—or warehouse—operation consists of packing into cartons for sale.

Cam supervises the first process, Curry the second and Carfax the third.

There are no quantity losses in process.

The output of Process 1 is charged to Process 2 at a figure which shows a profit of 10 per cent. on the transfer price, and that of Process 2 to Process 3 at a figure which shows a profit of 25 per cent. on such price.

The stocks carried by Process 2 are valued at the cost of the year's production.

The ultimate net profit, as shown by the firm's annual accounts, is divided between the partners in the ratio—Cam, one-fifth; and Curry and Carfax, two-fifths each.

The following particulars are supplied for the year to March 31, 1949:

			lb.	£
Process 1				
Raw materials used			15,680	784
Wages: crushing and mixing				1,372
Cam: management salary				400
Process 2				
Transfer from Process 1,				
Raw materials used			3,920	90
Coal and coke				100
Wages: furnace and mixing				1,470
Curry: management salary				400
Process stocks	lb.	£		
April 1, 1948	1,500	325		
(Subject to stock provision—£25)				
March 31, 1949	1,100			
Process 3				
Transfer from Process 2, including all opening stock			20,000	
Cartons				125
Wages				675
Carfax: management salary				600
Sales			18,000	9,000
Selling expenses				1,221

In respect of the year to March 31, 1949, it is required

(*a*) to write up the process accounts in detail; and

(*b*) to give the Profit and Loss Account, introducing such provisions as may be necessary to reduce stocks to cost, and showing clearly how the ultimate net profit is divided between the partners.

Institute of Chartered Accountants. May, 1949. Intermediate Examination.

PROCESS 1

	lb.	£		lb.	£
Raw materials .	15,680	784	Transfer to Process 2	15,680	2,840
Wages . . .		1,372			
Cam: salary . .		400			
		2,556			
Profit & Loss A/c, 10%		284			
		2,840			2,840

PROCESS 2

	lb.	£		lb.	£
Transfer Process 1	15,680	2,840	Transfer to Process 3	20,000	6,600
Raw materials .	3,920	90			
Coal and coke .		100			
Wages . .		1,470			
Curry: salary .		400			
	19,600	4,900			
add opening stock	1,500	325			
	21,100	5,225			
less closing stock .	1,100	275			
	20,000	4,950			
Profit & Loss A/c, 25%		1,650			
		6,600			6,600

Process 3

	lb.	£		lb.	£
Transfer Process 2	20,000	6,600	Sales . . .	18,000	9,000
Cartons . . .		125	Stock . . .	2,000	800
Wages . . .		675			
Carfax: salary . .		600			
		8,000			
Profit & Loss A/c .		1,800			
		9,800			9,800

Profit and Loss Account

	£		£
Selling expenses . .	1,221	Profits transferred:	
		Process 1 . . .	284
Process 3 stock provision.	194	Do. 2 . . .	1,650
		Do. 3 . . .	1,800
Balance c/d . . .	2,328	Process 2 stock provision amount written back (i.e. 25−16) . . .	9
	3,743		3,743
Cam: one-fifth . .	466	Balance b/d . . .	2,328
Curry: two-fifths . .	931		
Carfax: two-fifths .	931		
	2,328		2,328

In Process 2 it is apparent that the closing stock valued at £275 requires adjustment because of the 10 per cent. profit added in Process 1.

The cost of the year's production in Process 2 is £4,900, but had the transfer been made at cost, it would have been £284 less, i.e. £4,616.

The stock should then be valued at $\frac{1100}{19600}$ of £4,616, or £259, and thus the stock provision required here is £16.

In Process 3 the closing stock of £800 calls for a double adjustment.

Firstly, to the extent it is derived from Process 2 it has been inflated by 25 per cent. of the transfer price of £660, i.e. £165. Its cost in Process 2 would thus be £495.

Secondly, the latter figure contains the 10 per cent. profit added in Process 1.

The available totals are, as shown, 21,100 lb. at £5,225. The latter, reduced to cost, is £4,616 plus £300, or £4,916; and £466 is the proportion thereof attributable to a stock of 2,000 lb.

Summary

Process 2 provision required (see Profit and Loss Account above)	£16	
Process 3 provision required (£165 plus £29)	194	
		£210

(*c*) Cost and Selling Price

In ordinary competitive conditions rarely is the demand for a commodity fixed and unalterable.

The output of existing production plants may be absorbed readily enough to justify retaining the normal or current selling price and, in so doing, give a margin of profit over cost which provides a reasonable return on capital invested in the industry.

Sometimes attempts at stabilising selling prices may result from the action of all or a majority of producers who wish to protect themselves from the effects of a slump or even a temporary depression, and in these circumstances a chance of survival is given to the marginal firm or the manufacturer producing at the highest relative cost.

What must be appreciated, however, is that cost is equally influenced by the level of demand since output

will, in the ordinary course of events, be adjusted to conform to what it is believed can be sold.

Existing production facilities and the attitude of mind of those controlling them are often more or less static, that is to say many, perhaps the majority of businesses are content to operate within output limits which have tended in the past to yield satisfactory results.

The experience of trade recessions in the inter-war period, when well-founded concerns were faced with half-filled order books or less, seemed to provide an unanswerable argument against even a modest programme of expanding fixed capital equipment.

Would it earn its keep?

Could the extra output be sold at the expected profit?

At what price could it be sold at all?

But it is one thing to build new factories or instal new machinery; it is something very different, in times of flagging demand, to know what to do to restore activity within the production framework as it stands. And it is here that selling policy must be free to operate with a full realisation of the meaning of fixed and variable costs.

Therefore the cost accountant should be able to predict how far total costs are likely to be affected by a 5 per cent., a 10 per cent. or a 20 per cent. increase in sales volume.

A reduction in selling prices may be able to bring about this increase which, because of the incidence of fixed overhead, will almost certainly result in a lower cost per unit.

Can such lower cost be matched against the cut in selling price, and what bearing will these altered prime cost factors have on the profit and loss position?

Efficient systems of cost accounting and market research can do much to guide management in making its decision, but in the long run that decision will be made by reference to what constitutes the best long-term policy for the firm.

Immediate considerations which must be carefully weighed include:

(*a*) *The raw material position*

The quantities held in relation to estimated production for the next three or six months.

Facilities for stock replacement, and the trend of replacement prices.

The possibility of physical deterioration if materials are carried too long in stock.

(*b*) *Direct labour*

The effect on skilled labour of short-time working.

The extent to which piece rates and efficiency bonuses set in times of full production will have to be abandoned in favour of a basic minimum or time rate.

(*c*) *External matters*

A short-term policy of deliberate price-cutting to oust weaker producers from the market.

Efforts to create a new market by means of special publicity methods, or by selling temporarily at an uneconomic price.

(*d*) Whether reserves exist to take care for a time of current trading losses caused by reduced production.

Example

White & Co. opened a new factory on January 1, 1951. The capacity of the plant was 500 units per month, but owing to shortage of raw materials the output for the first year was only 4,000 units.

The records disclose the following information in respect of the year ended December 31, 1951:

		£
Sales, 3,500 units		10,500
(Sale price throughout the year £3 per unit.)		
Raw materials: purchases	£	
30 tons at £50 per ton	1,500	
50 tons at £60 per ton	3,000	
40 tons at £65 per ton	2,600	
		7,100

Stock of raw materials at December 31, 1951—20 tons.

Stock of finished goods at December 31, 1951—500 units.

Replacement price of raw material at December 31, 1951—£60 per ton.

Direct labour	2,000
Fixed factory overheads	1,560
Variable overheads	1,500
Administration (fixed)	1,680

You are asked to prepare a financial statement for the Board showing and explaining the results for 1951.

The Board are considering proposals to increase the price per unit and also ask for your advice as an accountant on the probable effect of this.

Give your reply, taking as examples new prices of £3, 2s. 6d., £3, 5s. 0d. and £3, 7s. 6d., and state the assumptions which you have made.

Society of Incorporated Accountants and Auditors.
November, 1952. Final Examination.

The financial statement and the report may be set out on the following lines:

Financial Statement

Year to December 31, 1951

1. *Factory Output*			4,000 units
	Per unit	£	£
2. *Sales*, 3,500 units	£3		10,500
3. *Cost of Output*	£ s. d.		
Raw materials used . . .	1 9 6	5,900	
Direct labour	0 10 0	2,000	
Prime Cost . .	1 19 6	7,900	
Variable overheads . . .	0 7 6	1,500	
Variable Cost .	2 7 0	9,400	
Fixed factory overheads (two-thirds proportion)	0 5 2½	1,040	
Administration (two-thirds proportion)	0 5 7	1,120	
	2 17 9½	11,560	
less closing stock of 500 units of finished goods @ £2, 17s. 9d. .		1,445	
4. *Cost of Sales*			10,115
5. *Trading Profit*	0 2 2½		385
6. *Less* under-absorbed fixed overheads:			
Factory		520	
Administration		560	
			1,080
7. *Net Loss for the Year*			£695

1. Factory capacity is 6,000 units p.a., so that the 1951 output was only two-thirds thereof.

2. Accordingly, one-third of the fixed overheads have been stated separately, and are not charged to the cost of output.

Report

It is assumed:

(*a*) That for 1952 the replacement price of raw material will be maintained at £60 per ton.

(*b*) That a stock of 500 units of finished goods is sufficient for the needs of the business, and that sales of 4,000 units p.a. can be made.

On this basis costs will increase by 6d. per unit in respect of raw material, making the total cost of output £2, 18s. 3½d., and the trading profit 1s. 8½d. per unit.

The effect on the profit and loss position of the suggested proposals will be:

	£ s. d.	£	£	£
Sales 4,000 units at	3 2 6	12,500		
	3 5 0		13,000	
	3 7 6			13,500
less cost thereof at £2, 18s. 3½d. per unit		11,658	11,658	11,658
Probable Profit		842	1,342	1,842
(Subject to deduction in each case of the under-absorbed overheads of £1,080.)				

1.

Give a specimen ruling for a Job Account to be kept in a Machinery Manufacturers' Cost Ledger and complete this from the following information:

		£
Direct wages—Week	1	138
	2	342
	3	591
	4	229
Direct materials		1,230
Stores issued		650
Stores returned		25
Erection costs at customer's site:		
Wages, £50; Travelling, £78		128

Works oncost—65% on direct wages.
Office oncost—12½% on works cost.
Selling price of machine, £5,150.

Society of Incorporated Accountants and Auditors. November, 1949. Intermediate Examination.

2.

The following is a summary of the entries in a Contract Ledger, as at December 31, in respect of Contract No. 150:

	£
Materials (direct)	3,000
Materials (from stores)	650
Wages	1,721
Direct expenses	671
Establishment charges	800
Plant	3,420
Sale of scrap	182
Sub-contract costs	721

You obtain the following information:

(1) Accruals at December 31 are wages £80, other expenses £112.

(2) Depreciation of plant up to December 20 is £855.

(3) Included in the summary of entries are wages £100, other expenses £150, since certification. The value of material used since certification is £208.

(4) Material on site at December 31 cost £1,000.

(5) £6,250 had been certified up to December 20, when three-eighths of the contract remained uncompleted.

(6) The total contract price is £10,000.

You are required to show what profit or loss should be taken into the accounts for the period ended December 31 in respect of Contract No. 150.

Institute of Chartered Accountants. May, 1948.
Intermediate Examination.

3.

Allus Limited process a patent material used in building. The material is produced in three consecutive grades, soft, medium and hard.

Figures relative to production for the first six months of 1946 are as follows:

	Process 1	Process 2	Process 3
Raw material used—tons	1,000		
Cost per ton	£20		
Manufacturing Wages and Expenses	£7,250	£4,080	£1,071
Weight Lost	5%	10%	20%
Scrap (sold at £5 per ton)	50 tons	30 tons	51 tons
Sale Price per ton (controlled)	£35	£50	£80

Management Expenses	£1,750
Selling Expenses	£1,000
Int.: on loan capital	£400

Two-thirds of Process 1 and half of Process 2 are passed on to the next Process and the balances are sold.

You are required to prepare a cost statement in a form suitable for presentation to the Directors at their next Board Meeting when the production policy for the first six months of 1947 will be discussed.

Institute of Chartered Accountants. May, 1947.
Intermediate Examination.

4.

Allcure (Manufacturing) Ltd. make a bottled patent medicine which is immediately transferred to Allcure (Selling) Ltd. at factory cost plus twenty-five per cent.

Included in the costing records of the manufacturing company for the 4-weekly period to September 26, 1952, are the following:

	£
Stocks on August 29, 1952:	
Ingredients, at cost	800
Bottles, at cost	400
Work-in-progress, at prime cost	550
Purchases:	
Ingredients	2,000
Bottles	800
Wages	620
Factory variable expenses	600
Manufacturing royalties	150
Transfer to Allcure (Selling) Ltd.	4,360
Stocks on September 26, 1952:	
Ingredients, at cost	950
Bottles, at cost	450

You are informed that:

(1) Closing work-in-progress is to be valued on the same basis as opening work-in-progress.

(2) Fixed expenses not shown above equal £200 per period.

You are required to prepare a Cost Summary statement in respect of Allcure (Manufacturing) Ltd. for the above period, in the form most likely to be of use for management control.

Institute of Chartered Accountants. November, 1952.
Intermediate Examination.

5.

The Process Company Ltd., commenced business on January 1, 1950, to produce a single product passing through processes *A* and *B*. There were no opening stocks.

The following figures relate to the first month's working:

	£
Direct materials purchased	50,000
Direct wages paid	35,300
Factory overheads incurred	27,600
Costs	
Process *A*:	
Direct material	32,000
Direct labour	18,500
Overheads	22,200
Process *B*:	
Direct material	8,000
Direct labour	16,800
Overheads	5,400
Output	
Process *A*:	*Units*
Completed and passed to Process *B*	32,000
Completed and passed to abeyance stores	4,000
In process, complete as to direct material, 25 per cent. completed as to direct labour and overheads	4,000

Process *B*:

Completed and passed to finished stock . .	22,000
In process, 50 per cent. complete as to direct material, direct labour and overheads . .	4,000

Design a cost statement and show thereon the detailed cost per unit for each process, the unit and total costs for the processes jointly, and the closing stock.

Institute of Cost and Works Accountants. June, 1951.
Final Examination.

6.

The Makem Manufacturing Co. produces 10,000 units per annum by employing 50 per cent. of the factory capacity. The selling price of the unit is £5 and the total costs were:

	£
Materials	10,000
Wages	20,000
Fixed overhead	10,000
Variable overhead	4,000
	44,000

Variable overhead maintains a constant ratio to the number of units produced.

The Company accepts an order for an additional 10,000 units at a selling price of £3, 17s. 6d. each.

The increased volume of purchases reduces the material prices by 2½ per cent. Wage rates remain constant, but due to the employment of new workers there is a drop in labour efficiency of 5 per cent. on all production.

Prepare a statement showing the variation of net profits resulting from the acceptance of the order.

Institute of Cost and Works Accountants. December, 1952.
Final Examination.

7.

The Shine Shoe Co. manufactures two grades of shoes, *A* and *B*. Manufacturing costs for the year ended March 31 were:

	£
Direct materials	100,000
Direct wages	56,000
Production overhead	24,000
	180,000

There was no work in progress at the beginning or end of the year. It is ascertained that:

(*a*) Direct materials in Grade *A* shoes cost twice as much as direct materials in Grade *B* shoes.

(*b*) The direct wages for Grade *B* shoes were 60 per cent. of those for Grade *A* shoes.

(*c*) Production overhead was the same per pair of *A* and *B* grades.

(*d*) Administration overhead for each grade was 150 per cent. of direct labour.

(*e*) Selling cost was 2s. 6d. per pair for each grade of shoe.

(*f*) Production during the year was:

Grade *A*: 40,000 pairs, of which 36,000 pairs were sold.
Grade *B*: 120,000 Do. Do. 100,000 Do. Do.

(*g*) Selling prices were £2, 15s. od. per pair for Grade *A* and £1, 15s. od. per pair for Grade *B*.

Prepare a statement showing the total cost per pair for each grade of shoe and the profit made on each grade of shoe.

Institute of Cost and Works Accountants. December, 1952. Intermediate Examination.

8.

The following figures are taken from the books and records of the Snowhite Laundry for the four weeks ended July 30, 1949:

	£
Materials used	50
Fuel used	41
Lighting, power and water	49
Boiler room wages	30
Productive wages	372
Advertising	12
Rent and rates	25
Office salaries	64
Collection and delivery wages	60
Do Do. lorry costs	180
General upkeep	142
Allowances to customers	8
Management salaries	50
Bad debts	17
Work charged to customers:	
House to house	970
Contract *A* (School)	51
Contract *B* (Hotel)	150

The work charged under contract is done at a special discount of 25 per cent. off normal charges. This discount has been taken off in arriving at the sums shown as charged.

The management require to know, *inter alia*, the variable costs of operating the laundry, and the burden of the overhead expenses, both in amount and in relation to the gross earnings.

You are required to prepare a monthly cost statement, incorporating the above figures and presenting them in the form most likely to be of assistance to the management.

Institute of Chartered Accountants. November, 1949. Intermediate Examination.

9.

A manufacturer commenced production on January 1, 1949, of a standardised article in two grades, *A* and *B*. Both are produced from the same raw material and are sold to wholesale concerns at uniform prices—Grade *A* at £15 per dozen, and Grade *B* at £24 per dozen.

Sales prices are based on the following estimated figures:

	Cost per Article				
	Grade A		*Grade B*		
	s.	*d.*	*£*	*s.*	*d.*
Direct material	3	0	0	5	0
Direct labour	10	0	0	15	0
Works overheads	5	0	0	7	6
	18	0	1	7	6
Selling and distribution overheads	1	9·6	0	2	9
	19	9·6	1	10	3

On making up accounts for the year ended December 31, 1949, the following facts were ascertained:

	Grade A	*Grade B*
Cost of direct material used	£1,330	£1,485
Direct labour	£3,610	£5,280
Works overheads	£5,927	
Selling and distribution overheads	£2,446	

During the year sales amounted to £9,000 in respect of Grade *A* and £12,000 in respect of Grade *B*, and stocks on hand at December 31 were 400 units Grade *A* and 600 units Grade *B*.

From the information given above you are required to prepare revised costings showing the cost per article sold during 1949.

Institute of Cost and Works Accountants. December, 1950. Intermediate Examination.

CHAPTER XII

BUSINESS BUDGETING

It is as necessary in individual and business affairs to take thought for the future as it is in the national finances, and the term Budgeting, in the sense in which we are going to consider it, implies the drafting of a carefully prepared programme giving formal expression to business plans and intentions for one or more future trading periods.

The responsibility for looking ahead in this way is not the sole prerogative of higher management; it involves a realisation by all senior and junior executives that neither an industry, nor a firm within that industry, can hope to progress if it is content to live from hand to mouth, and without seeking to follow as closely as possible a pre-determined course.

On broad lines of policy the directors will indicate what they think that course should be in the light of the resources available to the business and the external factors influencing the demand for its products.

Production research may suggest new and better methods of manufacture or the desirability of making component parts that are now bought outside. Sales research can similarly investigate the likely appeal of a new product and the time and outlay required to establish it in particular markets.

Inquiries of this kind are going on continuously in the efficiently run undertaking, and while primarily they may be aimed at increasing profits, there will be also the desire to give an improved and more comprehensive service to the customer.

The existing state of affairs should never be regarded

uncritically or as incapable of improvement because, after all, it reflects conditions which may hold good for perhaps a few months or one or two years only.

In a continuing business the long-term trend is much more significant as showing the manner in which major policies have come to fruition over a period of years. For this reason, while no one would decry the vital necessity for keeping a careful eye on current trading, projects that as yet exist only on paper—whether on the drawing-board or in the chemical laboratory—are of at least equal importance.

Thus what is planned by the technician or on the distribution side bears not only on the future Profit and Loss Account; it is going to affect the future Balance Sheet so far as fixed asset and working capital resources are concerned, and arrangements may have to be made well ahead of the event if there is to be a smooth and progressive expansion in these facilities.

In this respect the internal accountant will be expected to play his part, firstly by co-ordinating the forecasts and translating them into money values, and secondly by preparing reports for the information of the other executives so that they may know what the result is likely to be.

Successful budgeting depends on the thoroughness with which every aspect of the future trading and financial position has been discussed. Few tools of management have done more to assist in widening the outlook of all responsible employees and in reminding them that they are working towards a common goal.

The Revenue Budget

As all revenue activity is ultimately governed by sales, the sales forecast can be likened to the king-pin of the whole structure. Statistics of turnover rarely, if ever, appear in the published accounts of British companies, although

in Canada and the United States it is general practice to give this information by classes of products sold and according to their geographical spread.

In the ordinary course of business, sales trends will be examined by product lines in relation to the markets served and the finished stocks on hand, and one most useful feature of the sales budget is that it does call management's attention to slow-moving stocks and to cases where, for one reason or another, stocks have got out of balance as regards their component parts.

Normally the latter will not all be equally profitable, but they may be interdependent, and the fact should not be overlooked that very remunerative sales in one direction can help to maintain a state of full production by justifying the acceptance of relatively less remunerative orders for other products.

These factors qualify the approach to the sales estimate, which, however, must in the first instance take fully into account the reports of agents and of field salesmen. The personal contacts they have with customers, and their knowledge of the customer's business and the use he may make of the firm's products, clearly render such periodic reports to Head Office of the greatest value. But extremes of optimism and pessimism have often to be carefully discounted, if only because the reporter's view is to some extent coloured by his own necessarily limited experience.

The final survey of sales possibilities and the fixing of the sales target is a matter to be undertaken by higher management, or at board level, and it will include allowance for:

(*a*) Sales spread, or "mix", over the principal lines of product.

(*b*) Probable permanence of home and foreign demand, by products.

(*c*) The relationship between expected sales and present factory production capacity. (The latter may not be capable of quick expansion.)

(*d*) The desirability of leaving a margin for seasonal, special or "fill-up" lines.

Other important considerations are bound up with the nature of the product and the selling characteristics of the trade.

On the one hand, standard lines may be delivered from stock to wholesalers or retail stockists, and in the case of drugs, footwear and confectionery, for example, the sales demand can be reinforced by advertising on a national or regional scale.

In other cases, particularly where production is of the "one-off" variety, goods may only be made to specific order. Here, the carrying of stock is of quite incidental importance, and is usually limited to raw materials and component parts.

Where a relatively assured outlet exists, plans can be made for the future with much greater confidence, and it is much easier to forecast the bulk of sales demand. In these circumstances a six or twelve months' budget is by no means exceptional.

But in the heavy engineering, electrical equipment and machine tool industries the order book in normal times may not extend to more than two or three months ahead, and at that may be subject to fairly frequent revision.

On the whole, it is time well spent to consider at the outset how far the individual business is getting the share it can reasonably expect of the potential trade, and for this purpose the fullest use should be made of the statistics published by the Central Statistical Office and by trade journals.

It is also helpful for basic producers (selling to other manufacturers) to try to estimate how far factors adversely

affecting their customers at one or more stages removed may operate later to their own disadvantage.

In the reverse direction, it may be noted that defence orders in recent years have induced a fair number of firms to buy new machinery and equipment which they were reluctant to order before.

Production

Assuming the sales forecast has been made and has been approved by the board, or by the budget committee, management has now to consider the volume of factory output required for the period, having regard to the present and prospective finished stock position. This involves a detailed study of production processes and equipment, and the taking of steps to ensure that labour and materials will be available as and when required. It involves also the making of estimates as regards the various groupings of overhead expense.

Obviously no worthwhile conclusions can be reached about the measurement of these cost factors without discussion and co-operation between all the executives concerned. And it is often asserted, with truth, that such exchanges of view are among the most valuable benefits of budgeting, in that the entire organisation is invited to think on lines of carrying out a mutually agreed and understood policy.

The production budget will then be broken down into the relevant sections of direct labour, materials and expense. In each case the aim will be so to arrange matters as to take advantage of opportunities for planning an output programme which allows of a steady flow and long runs.

In this way piecework and bonus rates can be established, and bulk orders can be placed for raw material supplies at predetermined and competitive prices. It may be pointed out here that responsibility for placing large forward contracts compels a detailed study of raw material markets,

and the extent to which supply prices agreed upon compare with those ruling later in the budget period is in itself a measure of the buying department's efficiency.

As far as possible the production section will seek to spread plant operation evenly throughout the period and in the short run output may exceed or fall short of the sales estimate, especially where customers' orders do not accrue at regular intervals of time. From the production point of view the aim will be to maintain the most consistent and therefore the most economic rate of output. Its programme will be based on:

(*a*) The analysis of operations covering the routing of raw materials and components to processes and factory departments.

(*b*) A detailed survey of the direct labour required expressed in man-hours or machine-hours, involving the engagement of various grades of labour.

Here particularly erratic production is to be avoided, since the lower the rate of labour turnover the better the standard of morale and the quality of the goods produced.

(*c*) The study of incentives to ensure maximum output at minimum costs, first making certain that the bonus systems used are understood and accepted by the operatives.

(*d*) The provision of plant, tools and manufacturing supplies, together with power and maintenance facilities.

Expenses

In the first place, the cost ledgers should embody a standard classification of expense items to allow of ready grouping for fixed, variable and semi-variable charges. The last named include charges, the unit cost of which decreases as output increases, but not to such a marked extent as in the case of purely fixed expense.

On a shop or departmental basis, estimates will be submitted showing the provision required at the planned

level of production and explaining increases or decreases on the normal or previous period's figures.

It is desirable that such estimates should be drafted with reference to the responsibility factor, so that a particular executive can justify increases in the budget, or explain how reduced costs should result from new fixed capital outlay or changes in production methods.

No system of budgetary control is automatic and self-operating; it relies on the constant supervision of management, and from time to time the estimates may have to be re-opened and adjusted in the light of altered trading conditions.

Further, flexibility should be a main feature in budgeting practice in order to show probable changes in the amount of expense when the business is working above or below normal capacity, and this is particularly advisable if the budget period is seasonal as distinct from a fixed term of say six or twelve months.

The Capital Expense and Finance Budget

Many businesses find it convenient to draft a relatively long-term capital expense budget for anything from three to five years ahead. Probably for any period in excess of twelve months this is very tentative, and gives little more than a broad indication of major developments which the board have under consideration. If, however, fixed capital assets constitute the bulk of the total resources, its importance is likely to be considerable, and apart from the large amounts that may be involved there is the aspect of revenue costs versus capital costs. By this is meant that in the long run it may be more profitable to extend production facilities and pay interest on the new capital invested than to tolerate regular periods of overtime or double-shift working with the increased indirect costs that will be incurred.

The question of financial provision lies at the heart of

the matter both as regards additions to plant and buildings and the supply also of adequate working capital.

A cash or finance budget can be prepared for the same length of time as the estimates of periodic trading results, and offers the following advantages:

(*a*) Finance is linked with trading, and it can be seen how future receipts from customers will match up with operating expenses and payments to suppliers.

(*b*) A clear indication is given well in advance of the necessity to raise short-term loans or find a temporary investment for surplus funds.

(*c*) The preparation of a finance budget calls for a close study of money market conditions and the trend of interest rates, as well as the provision of cash margins to cover contingent liabilities.

CHAPTER XIII

FIXING THE STANDARD

Question. Recently you have been talking about the normal or expected sales, and in the same way about costs and profit. I suppose it is a matter of comparison between these and your actual sales and costs?

Answer. The whole idea of budgeting is to take stock of the present situation and use this as a starting-point for future operations. You hope your estimates will be verified by the results actually got and you make a comparison, month by month, to see whether this is the case.

Question. You mean, not only with sales but with costs as well?

Answer. It is important to remember that the average business can control many of its cost items much more readily than its sales turnover, at least so long as customers enjoy anything like freedom of choice.

Its costs are largely its own internal and domestic affair, and for that reason alone it is vital to know what they are in relation to the sales or output.

Let us look at it in this way. Your sales budget represents what you hope to get and, with reasonable luck, will get. In the final stages it has been adjusted to line up with production capacity and the general policy which management thinks is in the best interests of the business.

From this point onwards you build up your manufacturing programme, and you try to determine what your costs will be in the light of all the known factors.

It is a standard to which to work, hence the term Standard Costs.

Question. These are ideal costs, in the best possible conditions?

Answer. Not at all. They are costs reflective of ordinary efficiency in normal operating conditions; that is to say, they represent the expense you would expect to incur at the desired level of activity. You would be satisfied if costs were so much and no more.

But the level of activity itself is a most important matter. Suppose your factory is geared to produce a maximum of 100,000 units a year. That is the ideal output, seldom if ever to be reached in practice. Normal plant utilisation might, on the other hand, give an output of 80,000 or 85,000 units a year, at which level production can be most economically carried out; in other words, at costs which you adopt as standard.

There is the yardstick for comparison with actual expenses subsequently incurred.

Question. But, as I see it, the sales budget for any given period might not require production of as many as 80,000 units. Actual costs will then be quite different?

Answer. It will help to use the distinction we have already drawn between variable and fixed expenses. Variable costs per unit will probably be unaltered, but if you try to recover all the fixed expense over a smaller output the cost per unit will go up.

In this case standard costs will absorb so much of the fixed expense burden as is referable to normal or standard output and the balance will be shown separately on the returns to management as, for example, the cost of idle or surplus capacity.

It is clearly to this feature that management's attention must be drawn.

Question. Is the underabsorbed fixed overhead the only kind of difference you are likely to get?

Answer. First of all, we will give it the name by which it is usually known. It is a *variance* from standard, and of course it may be a favourable variance (+) or an adverse variance (−). Had 90,000 units been produced, in addition to the standard manufacturing profit there would be shown separately the gain due to the fact that some part of the overheads were fixed.

Question. I want to get this point clear. Where do you begin, with your normal sales or with the actual sales made?

Answer. With the actual sales. To put it shortly, what you are concerned with is the comparison between the *standard* costs of actual sales and the *actual* costs of those sales.

Among the many other advantages of this system of control by variances is the stimulus it gives to management in seeking new sales outlets or in trying by some means to raise turnover to the normal level.

Question. This makes the cost statements or comparisons much more useful?

Answer. Yes, but it also means that all is well where actual costs, line by line, conform to the standards laid down for the period. A busy executive, instead of having to study a mass of figures, is thus enabled to look only at those items of cost which are exceptional in that they differ from standard.

Hence we get the term "management by exception", but what is important for our purpose is that standard cost becomes really a tool of management.

It throws light on what has gone wrong, or worked out differently, and it does so in a way which helps the responsible executive to put things right.

Question. Can you give other examples of variances?

Answer. So far we have only mentioned fixed overhead,

but every item of cost may be affected, and throughout we have to consider the prior basis adopted for computing the standard figures themselves.

In the case of raw materials the average supply price ruling at the commencement of the period may be taken as the standard materials cost. If the prices at which the goods are actually bought prove to be more or less than standard we have a materials *price* variance. Here the explanation may be faulty estimation of the trend of prices, i.e. more has had to be paid than was allowed for. Alternatively, a favourable variance will emerge where—if a competitor has gone out of business—a bargain purchase of materials has been made in the period. On the other hand, there may be no question whatever of a price variance if at the outset forward contracts have been entered into with the supplier at agreed rates.

But another kind of variance—a *usage* variance—is also important, and again we have to look for guidance to the basic procedure.

In the specification of a particular product so much may be allowed for material consumption. If more is used than was specified, the usage variance reveals the fact and calls for explanation, as, for example, that material was spoilt in process, or was damaged because of unsatisfactory methods of storing before it came into the factory.

A third possibility is, of course, that with a new product the standard usage itself was underestimated, although this would be unusual because trial runs would be made before starting regular production, and careful observation would indicate what the standard ought to be.

We may as well consider, too, the direct labour cost. If, as is to be expected, the manufacturing processes are broken down into a number of operations, it is almost certain that each one will have been planned for time or piece rate purposes, and for ensuring a smooth and uninterrupted flow of components to the assembly line.

In normal conditions a standard time can be set for the job on the assumption that materials, tools and supervision are available as and when needed. This determines the standard wage cost. But if a different grade of labour is used (earning more or less than standard), a labour cost variance is shown.

Question. Are there any limits to management's ability to control these variances?

I mean, some factors may be altogether outside their control?

Answer. It is generally possible to distinguish controllable variances that can be dealt with by the executive most nearly concerned. For others, due to external factors, there may be no remedy—as in the case of a general rise in raw material prices. The production manager, however, may be in a position to correct excess usage.

It is possible that, owing to low stocks of the material specified, a slightly different type had to be used which was received from the supplier in sizes that made cutting necessary. Here you have two kinds of variance: one for the cutting and trimming labour required, and a usage variance for the material waste.

Question. Do these standard costs hold good for the whole of the budget period?

Answer. Neither is inflexible. If, towards the end of the period, sales fall appreciably, and there is no obvious way of restoring them, the output programme will have to be adjusted.

Similarly, changing conditions of manufacture may demand a re-setting of standards in cases where, during the period, wage rates are altered or some entirely different kind of raw material is permanently substituted.

It would be fatal to rely on a target cost that was clearly out of step with the facts. Moreover, a false sense of security

would be created if actual results proved to be better than a target which in the first instance had been set too low. That is why, as with budgeting, the utmost care has to be taken in building up the preliminary data, and the final survey must be made by a budget or cost committee of which all the senior executives are members.

Question. Can we now take a simple example based, say, on labour costs?

Answer. Suppose that during the week the operatives in the shop work a total of 500 hours, for which they are paid £100.

The normal, or standard time for the work done is 520 hours, and the standard wage rate is 3s. 9d. per hour.

In the cost records—which are maintained at standard—you have got to deal with three sets of facts.

Firstly, the job accounts will be charged with £97, 10s., i.e. 520 standard hours at the standard rate of 3s. 9d.

Secondly, there is a labour cost variance (adverse) of 3d. per hour which, on the 500 hours actually worked, amounts to £6, 5s.

And thirdly, it is important to record a favourable efficiency variance, because work corresponding to 520 standard hours has been completed in 500 clock hours, that is to say, there is a gain of £3, 15s., representing 20 hours at the standard rate.

Merely to know that £100 is the actual wage cost is not enough. The separate statement of the variances enables inquiries to be made to see why they have arisen, and management is given a pointer which it can use.

CHAPTER XIV

STANDARD COSTS

THE two examples given below will repay careful study. The first is designed to show the form and layout of standard costs, while the second makes the comparison between actual and standard and does so by bringing out clearly the relative variances.

In the first case the facts are set out in straightforward and orderly fashion, and it is only a question of marshalling them to arrive at the standard cost of a given quantity of finished product.

If the sequence of the operations is followed it will be seen that the costings fit in with and reflect the facts, and at the same time provide a framework for subsequent comparison with the actual figures, period by period.

In practice, it is the care with which the preliminary data has been assembled that matters. From a mass of information—both technical and financial—the cost accountant has to sift that which is required for his purpose.

The manufacture of component *A* involves three operations:

1. The castings are turned on a lathe.
2. The turned castings are drilled.
3. The components are then packed in cartons.

The following figures have been adopted as technical and financial standards:

(*a*) Weight of castings before turning . . 1,138 lb. per 1,000.
(*b*) Weight of castings after turning . . 1 lb. each.

(c) Suppliers' charge for castings . . . 1s. per lb.

(d) Suppliers' charge for cartons . . . 2d. each.

(e) Of every 100 castings turned, five are scrapped at the end of that operation because of faulty castings and these are returned to the suppliers, and a credit note obtained for 1s. per faulty casting.

A further five are scrapped because of faulty turning.

(f) Of every 100 castings drilled, five are scrapped because of faulty drilling.

(g) All scrap metal is sold at 6d. per lb.

(h) Time taken for operations:

Turning 10 castings per hour.
Drilling 60 Do. Do.

(i) Labour cost:

Turning 3s. per hour.
Drilling 3s. Do.
Packing 1s. per 60 components packed.

(j) The relevant overheads are to be included as follows:

Turning at 2s. per hour.
Drilling at 1s. 6d. Do.
Packing at 1s. per 60 components packed.

Compile a statement showing the standard cost of producing 1,000 components packed in cartons.

Institute of Chartered Accountants. May, 1949.
Final Examination.

By reason of the loss in process it is first necessary to determine the gross number of castings with which manufacture began.

Thus castings drilled must have been $1000 \times \frac{100}{95}$ or 1,053,

and similarly castings turned were $1053 \times \frac{100}{90}$ or 1,170.

Using these figures for the process accounts, we have:

TURNING

	lb.	Units	£	s.	d.
Materials	1,331	1,170	66	11	0
Labour			17	11	0
Overheads			11	14	0
	1,331	1,170	95	16	0

	lb.	Units	£	s.	d.
Suppliers C/N	58½	58½	2	18	6
Cash—scrap	58½	58½	1	9	3
Do. Do.	161		4	0	6
Balance c/d	1,053	1,053	87	7	9
	1,331	1,170	95	16	0

DRILLING

	Units	£	s.	d.		Units	£	s.	d.
Balance b/d	1,053	87	7	9	Cash—scrap .	53	1	6	6
Labour .		2	12	6					
Overheads .		1	6	3	Balance c/d .	1,000	90	0	0
	1,053	91	6	6		1,053	91	6	6

PACKING

	Units	£	s.	d.		Units	£	s.	d.
Balance b/d	1,000	90	0	0	Standard Cost .	1,000	100	0	0
Labour .		0	16	8					
Cartons .		8	6	8					
Overheads .		0	16	8					
	1,000	100	0	0		1,000	100	0	0

Note.—The foregoing shows the advantage of including quantities as well as values in the cost statements.

The Comparison of Standard with Actual Costs

Carrying the matter further, the second illustration deals with the reconciliation, through variances, of the standard and actual figures. The adverse variances are shown in *italic* figures.

It will be noted that the standard or budgeted profit was £1,718, 15s., net adverse variances reducing this to an actual profit of £1,408.

The form of the Profit and Loss statement submitted would, in practice, be accompanied by detailed schedules explaining why the actual results differed from those which were planned.

The vertical arrangement shown here is in line with present-day management accounts, and is conveniently summarised to give quickly a comprehensive view of the position.

The company builds radio cabinets, which sell at £3 each. Its financial year is divided into four-weekly periods, in each of which the budgeted output is 1,000 cabinets.

The standard cost for the twelve weeks ended December 19, 19—, is

	£	s.	d.
Raw material	0	12	6
Direct labour	1	0	0
Fixed overhead	0	8	6
Variable overhead	0	6	6
Per cabinet	2	7	6

From the commencement of that period raw material costs rose by 10 per cent., while a saving of 5 per cent. was effected in direct labour rates. Neither change had been reflected in standard cost.

The actual output for the twelve weeks was 2,750 cabinets, and purchases of raw materials amounted to £2,200.

Actual costs were found to be:

	£
Raw materials used	1,925
Direct labour	2,650
Fixed overhead	1,400
Variable overhead	867

Profit and Loss Statement

Period 12 weeks ended December 19, 19—

	Standard and Variances £	s.	d.	*Actual* £
Sales				
Standard	9,000	0	0	
Quantity variance	*750*	*0*	*0*	8,250
Material Cost				
Standard	1,718	15	0	
Variances:				
Price	*171*	*17*	*6*	
Usage	*34*	*7*	*6*	1,925
Labour Cost				
Standard	2,750	0	0	
Variances:				
Rate of pay	137	10	0	
Efficiency	*37*	*10*	*0*	2,650
Variable Overhead				
Standard	893	15	0	
Variance:				
Expenditure	26	15	0	867
Fixed Overhead				
Standard	1,168	15	0	
Variances:				
Expenditure	*125*	*0*	*0*	
Volume	*106*	*5*	*0*	1,400
Standard cost of sales	6,531	5	0	
Total variances	*310*	*15*	*0*	6,842
Profit	1,718	15	0	1,408

Question. Here, you are taking sales as being equal to output. There is no finished stock to consider?

Answer. That is the assumption. For the sake of simplicity we are assuming that the whole output is sold to radio manufacturers in each of the 4-weekly periods, and the quantity variance may be due, *inter alia*, to cancellation of customers' orders before production got into its stride.

Question. Will you explain how you arrive at the materials price and usage variances?

Answer. Well, the standard cost allowed for was 12s. 6d., but the actual cost was 10 per cent., or 1s. 3d. more, so the price variance is 2,750 × 1s. 3d., or £171, 17s. 6d., and is shown in *italic* as an adverse variance.

In the same way material usage was in excess of standard. If you divide the raw materials used—£1,925 by 13s. 9d. —the output ought to have been exactly 2,800 cabinets in contrast to the 2,750 actually made and sold.

Somewhere in the manufacturing process this materials consumption has taken place without equivalent output. The adverse usage variance is therefore 50 × 13s. 9d. or £34, 7s. 6d.

Question. And the labour variances?

Answer. That for rate of pay is favourable; pay rates fell by 5 per cent., and as the standard was £1 per cabinet, or £2,750 on the actual output, actual wage costs ought to have been £2,750 less £137, 10s. 0d., i.e. £2,612, 10s. 0d.

In fact they amounted to £2,650, and the *italic* efficiency variance of £37, 10s. 0d. must be investigated. One reason may be that, on a time basis, it took a little longer to make part of the output. The point is, the cause must be found and, if possible, corrected.

Question. Variable overhead seems straightforward. If 3,000 units were produced, you reckoned a charge of 6s. 6d

would absorb this, so with a reduced production of 2,750 units the charge should have been 2,750×6s. 6d., or £893, 15s. 0d.—in other words your standard?

Answer. Yes, and the reason for the actual overhead being lower may be that some items, say manufacturing supplies, were bought more cheaply.

But the *fixed* overheads are a different matter. When constructing the standard you based your calculations on fixed overhead of £1,275 per month and an output of 3,000 cabinets per month, which gave you a unit rate of 8s. 6d.

Applying this rate to the actual output, only £1,168, 15s. 0d. was absorbed, and there is an adverse *volume* variance—volume of work done being less—of £106, 5s. 0d.

The adverse *expenditure* variance requires scrutiny to see where items of fixed costs have gone up, perhaps in the form of additional works office salaries or canteen expenses; or how far the standard was too optimistic in its allowance for these charges.

Finally, the Profit and Loss statement shows clearly in what directions the profit of £1,718, 15s. 0d. that ought to have been made is reduced to the actual profit of £1,408.

1.

The following information has been obtained from the cost ledgers of Alluse Ltd. for 1948:

	£
Heating	1,600
Rates	400
Lighting	2,000
Depreciation of plant	3,500
Clerical salaries	12,000
Management	6,000
Power	4,500

	£
Non-productive wages (in factory)	12,250
Plant repairs and maintenance	10,000
Defective work	2,800
Consumable stores	7,500
Selling salaries and expenses	7,330
General expenses	4,600
Receipts from sale of scrap	1,200
Profits on canteen	450

Production has been 100,000 units, the prime cost of which has been materials 18s. and wages 12s. per unit. The net selling price was 47s. per unit, all units being sold.

As from January 1, 1949, the selling price was reduced to 45s. per unit. It was estimated that production could be increased in 1949 by 50 per cent. without adding an extra shift.

You are asked to prepare statements showing

(*a*) the various elements of cost in 1948; and

(*b*) the estimated costs and profit for 1949, assuming that 150,000 units will be produced and sold in that year.

State clearly any assumptions you make, and show your workings.

Institute of Chartered Accountants. November, 1949.
Intermediate Examination.

2.

The standard costs of making two types of component, which are made from the same raw material, are as follows:

	A s.	*A* d.		*B* s.	*B* d.	
Raw material	3	4	(1 lb.)	5	0	(1½ lb.)
Labour	1	6		2	0	
Raw material scrap allowance	0	4		0	6	
Overhead	2	6		3	4	
	7	8		10	10	

During the month of July, 12,000 lb. of material are bought at an actual cost of £1,920.

The budgeted production for July was 5,200 components of *A* and 3,300 of *B*.

Actual production was 5,000 and 3,000 respectively, while actual material consumption was 5,600 lb. on *A* and 5,400 lb. on *B*.

Actual overhead expenses for the month were £1,275.

On the assumption that there is no divergence between actual and standard labour costs, prepare a statement showing total costs of production for the month, including variances between actual and standard costs.

CHAPTER XV

ONE SET OF BOOKS

NOTHING like uniformity can possibly be expected in the ordinary accounting records of businesses, even those operating in the same industry, and this is as it should be, because uniformity, agreed upon within or imposed from without would almost inevitably act as a drag on progress.

In the field of management accounting, in particular, the door must be left open to allow of modifications in the system of records so that it can be quickly reshaped to meet fundamental changes in the industry and quickly respond to demands for information that may lack any kind of precedent.

To-day, the coming into prominence of standard costs has emphasised the importance of an elastic view chiefly because accounting is a tool and not an end in itself, and the wider the field in which the tool can be applied without loss of speed and precision the greater the use that will be made of it.

In the early days of costing reliance was placed on memoranda extracted periodically from the financial books of account. It was, on the whole, an "after the event" analysis of expenditure carried out on lines that would be more familiar and therefore more useful to factory management than anything like the formal and summarised statement submitted to proprietors.

But it had two serious defects. In the first place, the breakdown of expense did not necessarily follow any coherent plan because it stemmed from what were primarily conventional bookkeeping records, and secondly because often the information was only forthcoming after a fairly long interval of time.

In these circumstances the complaint tended to be made

that cost data and reports were unrealistic and therefore of very limited use, and frequently the considerable tabulation involved before the advent of office machinery made their presentation little more than a routine figure exercise.

At a later stage, and especially when increasing attention was given to the study of wage payments and incentives, and to the implications of a large investment in raw material and component stocks, it was clearly understandable that the inadequacy of financial accounts as the sole basis should be apparent to all.

This realisation led to the emergence of independent cost records of the kind we considered in Chapter X.

As far as they went they duly observed the double entry principle, and again as far as they went they ran on lines parallel to the financial books, so that, in theory at least, a reconciliation could be attempted between the audited profit and the net factory profit.

How far there may be any real justification for keeping two sets of records to fulfil one main function is open to a good deal of doubt. A common experience was (and is to-day) that the dual system did not really alter the analytical character of the cost books as such. More pertinently, in their scope they were often restricted to the field of inquiry which was generally thought to be the cost accountant's province; they did not tell the whole story.

With standard costing, on the other hand, only one set of records is necessary, and from these both management and proprietorship accounts can be prepared.

An outline of the position (with reference to the second example in the preceding chapter) is given below:

PERSONAL LEDGER

Supplier

		£
	Materials purchased (3,200 at 13s. 9d.) .	2,200

Materials

	£		£	s.
Supplier . . . (3,200 at 12s. 6d.)	2,000	Production Account .	1,718	15
		Material usage variance (50 at 12s. 6d.)	31	5
			1,750	0
		Stock c/d (400 at 12s. 6d.)	250	0
	2,000		2,000	0
Stock b/d . . .	250			

Material Price Variance

	£		£	s.	d.
Supplier . . . (3,200 at 1s. 3d.)	200	Profit and Loss Account (2,750 at 1s. 3d.)	171	17	6
		Material usage variance (50 at 1s. 3d.)	3	2	6
		Balance c/d . .	25	0	0
	200		200	0	0
Balance b/d . .	25				

Material Usage Variance

	£	s.	d.		£	s.	d.
Material Account .	31	5	0	Profit and Loss Account	34	7	6
Materials price variance	3	2	6				
	34	7	6		34	7	6

Direct Labour

	£	s.		£	s.
Cash	2,650	0	Production Account .	2,750	0
Labour cost variance .	137	10	Labour efficiency variance	37	10
	2,787	10		2,787	10

Labour Cost Variance

	£	s.		£	s.
Profit and Loss Account	137	10	Direct Labour Account	137	10

Labour Efficiency Variance

	£	s.		£	s.
Direct Labour Account .	37	10	Profit and Loss Account .	37	10

Fixed Overhead

	£		£	s.
Cash	1,400	Production Account .	1,168	15
		Variances		
		Volume . .	106	5
		Expenditure .	125	0
	1,400		1,400	0

Fixed Overhead Volume Variance

	£	s.		£	s.
Fixed overhead . . (250 at 8s. 6d.)	106	5	Profit and Loss Account .	106	5

Fixed Overhead Expenditure Variance

	£		£
Fixed overhead . .	125	Profit and Loss Account .	125

Variable Overhead

	£	s.		£	s.
Cash	867	0	Production Account .	893	15
Variance					
Expenditure . .	26	15			
	893	15		893	15

Variable Overhead Expenditure Variance

	£	s.		£	s.
Profit and Loss Account	26	15	Variable overhead . .	26	15

Production

	£	s.	
Materials . .	1,718	15	
Wages . . .	2,750	0	
Fixed overhead .	1,168	15	
Variable overhead .	893	15	
(2,750 at £2, 7s. 6d.)	6,531	5	

In the above ledger accounts it will be noted that

(*a*) credit must clearly be given to the supplier for the actual cost of purchases;

(*b*) the Materials Account and the Production Account are maintained at standard.

1.

The Trading and Profit and Loss Account of X Ltd. for the year ended December 31, 1951, is as follows:

	£		£
To Materials . .	3,400	*By* Sales (7,200 units) .	7,200
Labour . . .	2,140		
Direct charges . .	400		
	5,940		
General works charges	440		
Office charges . .	300		
Net Profit .	520		
	7,200		7,200

The standard output for the year covered by this account was fixed at 10,000 units. Standard costs per unit adopted were:

	s.	d.
Materials	9	0
Labour	6	0
Direct charges	1	0

General works charges are fixed at £300 per annum, the balance of expenditure being variable, with a standard of 6d. per unit.

Office charges are fixed at £300 per annum.

You are required to prepare a Profit and Loss statement showing the standard cost figures, actual costs and variances, suggesting reasons for the variances shown.

Assume no opening and closing stocks.

Society of Incorporated Accountants and Auditors.
May, 1952. Final Examination.

2.

Manufacturers of medicinal tablets pack their tablets in bottles each containing 100 tablets. Their standard costings per bottle for a particular type of tablet are:

	(*Cost per 100 tablets*)	
Chemical ingredients	1·5	pence
Labour, mixing and tableting	·75	
Factory overheads	·85	
Packing—materials	2·4	
labour	1·0	
overheads (40% on labour)	·4	
	6·9	
Selling costs	2·1	
Surplus	3·0	
Selling price	12·0 (1s.)	

Sales are mainly through a subsidiary Company having a chain of retail shops, and the manufacturing Company

charges the subsidiary at selling price giving an overall credit at the end of the year of $1\frac{1}{2}$d. per bottle.

An order for 100,000 bottles is executed at the following factory costs:

			£
Ingredients			730
Labour—Mixing			215
	Tableting		160
Factory overheads:	Mixing and drying		125
	Tableting		215
	General		140
Packing costs:			
Materials—Bottles			750
	Corks and caps		75
	Sundries		50
Labour			450
			2,910

(*a*) You are required to prepare for presentation to the management a sheet showing the cost per bottle in comparison with the standard, adding any comments you think likely to be of assistance to the board.

(*b*) A quantity of these bottles are in stock in the factory and there are also a quantity in stock in the subsidiary Company at the balance sheet date. At what value should they be taken into stock in both cases?

Society of Incorporated Accountants and Auditors.
November, 1949. Final Examination.

CHAPTER XVI

GRAPHS AND CHARTS IN COSTING

From the standpoint of the busy executive it is generally conceded that any device which conveys information in a manner calculated to arrest the eye and absolve the reader from the necessity of a detailed study of numerical statements has much to be said in its favour.

For this reason graphical methods of presentation (using the words in their broadest sense) have come to acquire a definite status in business management and, when allied to the technique of statistical analysis, go far to supplement the work done by the accountant, and by the cost accountant in particular.

Where long-term trends are under survey, where it may not be desired to disclose the exact amounts of sales and costs, and where it is a question of grasping the relative as distinct from the absolute significance of a business project, the drawing of a graph incorporating two or more related sets of data may drive home an appreciation of all that is involved.

The wise use of a sheet of squared paper helps to bring out the relationship between various items of a revenue and capital character of which the following are only a few examples:

(*a*) The proportions, to sales turnover, of

(1) factory output;
(2) finished stocks;
(3) advertising expense;
(4) orders received;
(5) orders on hand.

(*b*) The proportions of indirect to direct labour.

(*c*) The proportions of working capital to fixed capital.

But where attempts at forecasting are made in conjunction with a system of budgetary control and standard costs, the figures themselves are of relatively less importance than the disclosed trend.

The forecasts of future operating results call for a flexible and never a rigid interpretation, although it is desirable to compare realisations with estimates.

A graph or chart is a visual aid; probably it can do no more than hint, but it has the merit of compressing into convenient compass the vital facts of a situation so that a guide rather than a mandate is furnished to the reader.

Among the better known are the break-even chart and the Z chart. The former is concerned with indicating the "profitless point" at which sales made equal the fixed and variable expenses incurred, but at the same time it shows the estimated profit or loss which will result from increased or reduced activity.

The following are the estimated figures for 1951 in respect of a General Agency:

The proportions of gross sales by departments to gross turnover of the agency are estimated to be:

Department A	20 per cent.
Department B	30 Do.
Department C	50 Do.

The average commissions to be earned, calculated on selling price, are:

Department A	10 per cent.
Department B	20 Do.
Department C	30 Do.

Fixed expenses £4,000

Variable expenses for the first £8,000 of commissions earned amount to half of the commissions, and thereafter they represent one-tenth of the further commissions earned.

From the above data you are required

(*a*) to prepare a Break-even chart, with 4 pin points;

(*b*) to calculate the estimated profit or loss on a gross turnover, during 1951, of £50,000.

Institute of Chartered Accountants. November, 1950.
Intermediate Examination.

Note.

		Total	Dept. A	Dept. B	Dept. C
Gross sales		£50,000	£10,000	£15,000	£25,000
Commissions		11,500	1,000	3,000	7,500
			10%	20%	30%
Expenses	£				
Fixed	4,000				
Variable	4,350				
		8,350			
Estimated Profit		3,150			

If the variable costs can be reduced by the introduction of new or improved production methods, and if the fixed cost line can be set lower, the business may be able to make a profit on a lower sales turnover.

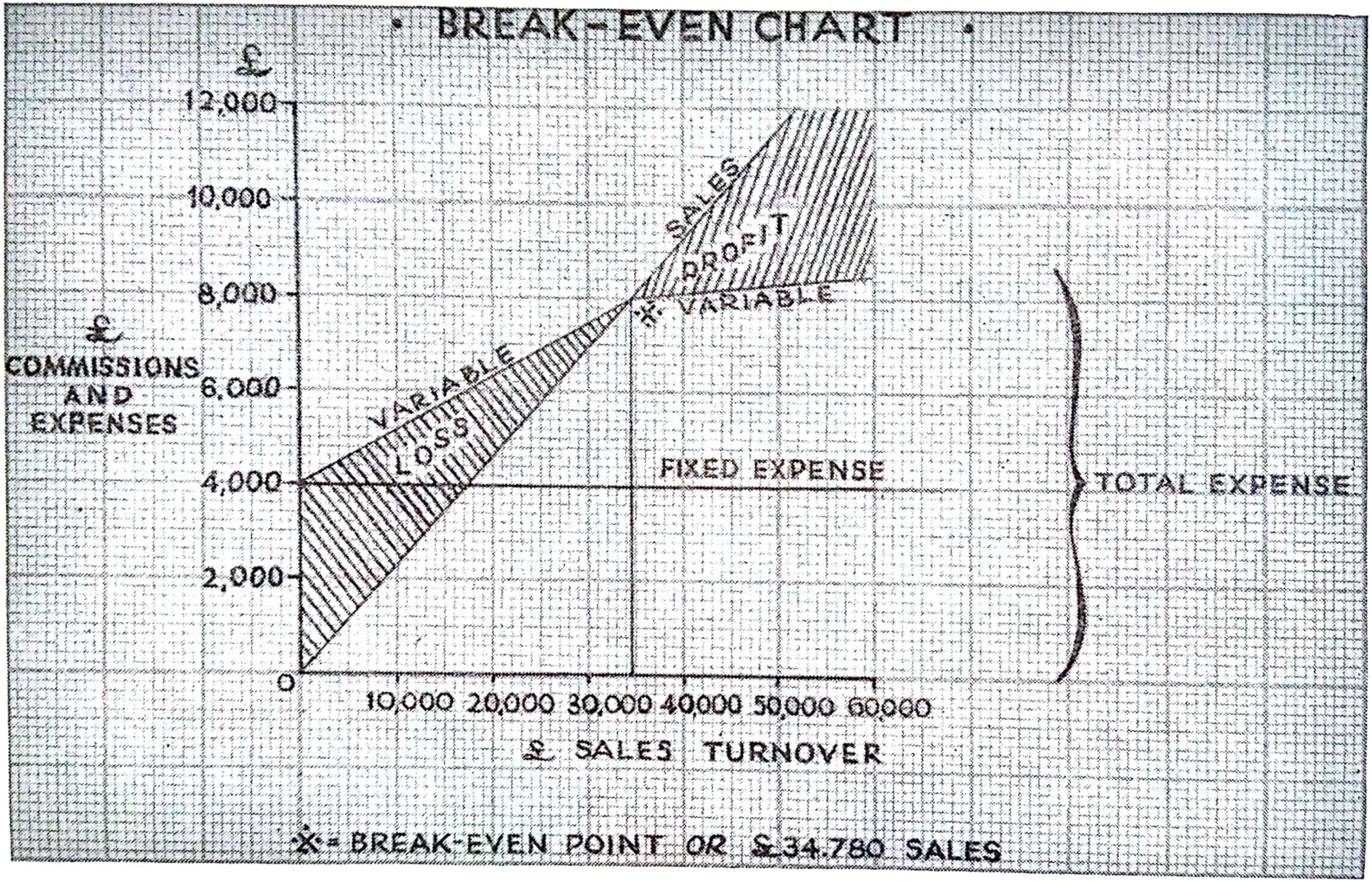
The Z Chart

Reference has already been made in Chapter XII to the importance of the sales budget. The Z chart (so called because the three lines of which it is composed are in the form of a Z) shows—

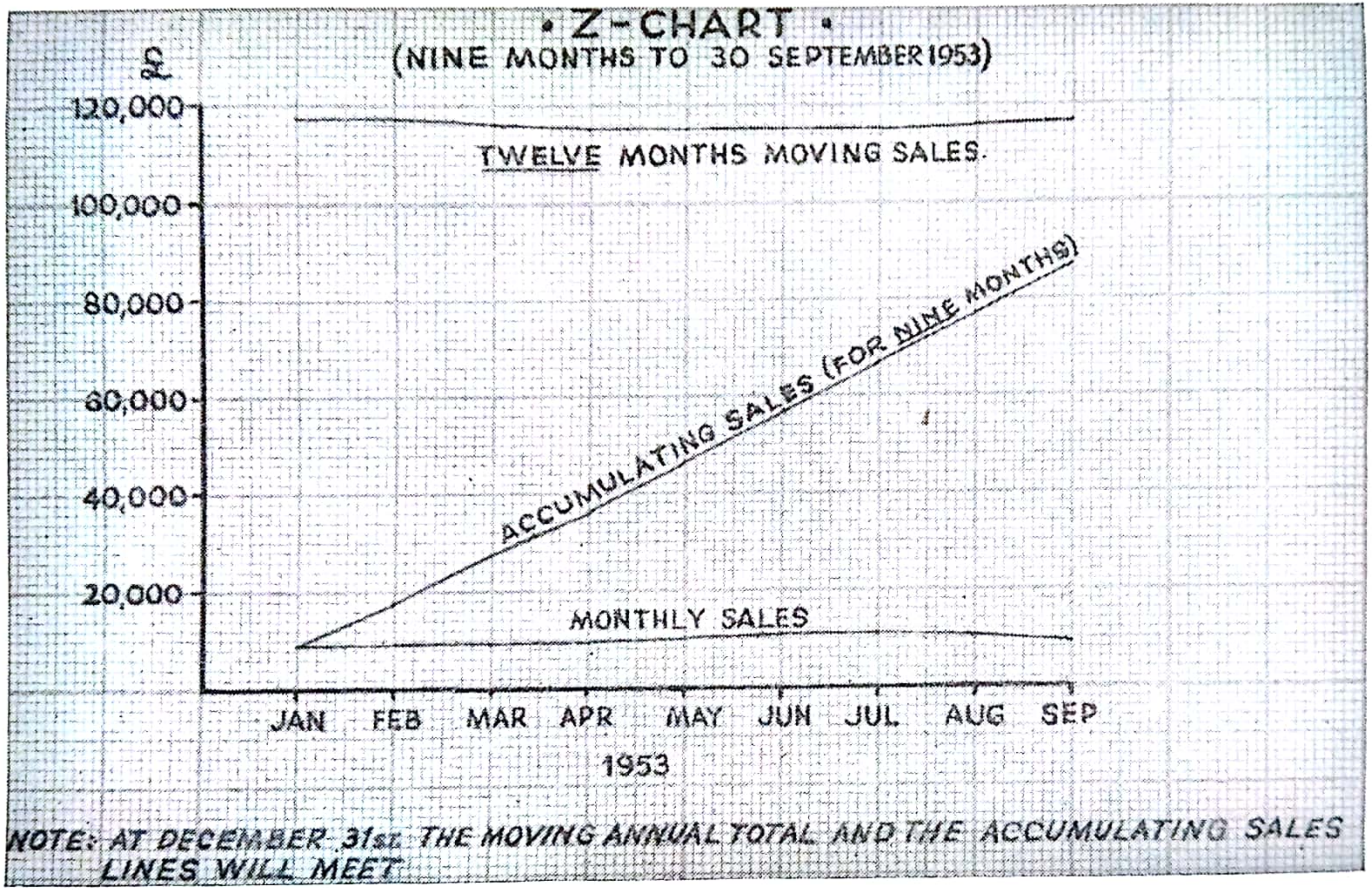
(*a*) Monthly sales.

(*b*) Accumulative months to date sales.

(*c*) The moving annual trend of sales.



BREAK-EVEN CHART
£
12,000
10,000
8,000
6,000
4,000
2,000
0
£
COMMISSIONS
AND
EXPENSES
SALES
PROFIT
VARIABLE
VARIABLE
LOSS
FIXED EXPENSE
TOTAL EXPENSE
10,000 20,000 30,000 40000 50,000 60,000
£ SALES TURNOVER
※ = BREAK-EVEN POINT OR £34.780 SALES


• Z-CHART •
(NINE MONTHS TO 30 SEPTEMBER 1953)
£
120,000
100,000
80,000
60,000
40,000
20,000
TWELVE MONTHS MOVING SALES.
ACCUMULATING SALES (FOR NINE MONTHS)
MONTHLY SALES
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
1953
NOTE: AT DECEMBER 31st THE MOVING ANNUAL TOTAL AND THE ACCUMULATING SALES LINES WILL MEET

In brief, it can be said that the first shows the short-term fluctuation in turnover, the second the progressive accomplishment, and the third, on the basis of twelve months to date, eliminates irregular or seasonal variances.

From the following figures of sales it is required to prepare a Z chart for the period January 1, 1953, to September 30, 1953, showing:

(*a*) The monthly sales during that period;

(*b*) The accumulating sales totals; and

(*c*) The moving annual total of sales.

	1952	1953
	£	£
January . .	—	8,850
February . .	9,100	8,700
March . .	10,300	9,150
April . . .	10,100	9,750
May . . .	10,150	9,900
June . . .	10,100	10,050
July . . .	10,250	10,500
August . .	9,850	10,200
September . .	9,200	9,600
October . .	9,000	
November . .	9,450	
December . .	11,250	

Before turning to the chart, it may be mentioned that the monthly sales (*a*)—as a separate matter—might be drawn to a bigger scale in order to show more clearly month by month changes.

A refinement would be to introduce the budgeted sales in coloured lines, in effect super-imposing on them the actual sales as shown above.

CHAPTER XVII

SOME ASPECTS OF MANAGEMENT ACCOUNTING

Question. What is Management Accounting?

Answer. In the previous chapters an attempt has been made to show the part played by the cost accountant in assembling cost data on the basis either of past performance —historical costs—or of comparing such costs with a more or less predetermined standard. In the years since the second world war there has been a marked increase in the scope of the internal accountant's responsibility to the extent that in the majority of cases to-day he has come to take a part in the management of business.

Question. You mean that cost accounting is only a part of management accounting?

Answer. Broadly speaking, the answer is yes, and this is particularly the case where an alert management will be at least as much concerned with the interpretation of cost records as with their compilation. But even that is only part of the story. New problems have had to be faced and these have affected both financial and trading policy. The provision of information to assist in solving these problems is a task for the internal accountant where he can take a wide view and remember that he is a businessman first and an accountant second.

Question. Will you give me examples of some of these problems?

Answer. It will often be necessary to forecast the future

working capital and fixed capital position. Double shift working may be introduced to cope with a big increase in orders following the launching of a new product or entry into a new sales market. How much extra working capital will be needed for example, in the form of additional raw material stocks to be carried and to provide for increased credit to customers, i.e. bigger book debts outstanding? What operating costs are more or less fixed, or more or less variable? Then, as regards fixed capital investment, plans may be under consideration to retool an existing department, or to bid for some other business which may usefully be combined with our own.

Obviously the financial and trading implications are related, and they can usually best be studied through the medium of draft reports and estimates prepared for the purpose. Nor should the effect of outside factors be overlooked—these of themselves emphasise the need for a wide and informed view.

Question. What are these outside factors?

Answer. They may include selectivity in taxation—Purchase tax: special capital allowances for taxation—initial and investment allowances: assistance to absorb unemployment in the less prosperous areas—these are a few of the matters which inevitably have an effect on the individual business to a greater or less degree. To-day no business can work in isolation from them, or in ignorance of the spur or brake they are designed to apply to the community as a whole. Then there are the effects of the continuing of mild inflation, and the falling value of the monetary unit.

Question. But surely inflation is more a matter for the economist than the accountant?

Answer. It is of real concern to both. Management accounts can be the more helpful if they indicate, in a

period of gradually rising prices, how far adequate charges should be made against gross receipts to take care of such matters as the increasing cost of replacing fixed assets and of replenishing stocks of raw materials. One company has in recent years seen fit to exemplify this kind of problem in the following way:

> "The board must ensure that enough money is regularly put aside to pay for the replacement of worn out machinery. If a machine is estimated to have a life of say twenty years, every year 5 per cent. of its original cost has to be set aside, so that when it is worn out a new one can be bought. Price rises have complicated this situation. For example, if three machines bought in 1939 cost £20,000 and their life was estimated at twenty years, every year £1,000 would have been put aside so that they could be replaced in 1959. But now three similar machines might cost as much as £60,000, so the amount saved (£20,000) would only pay for one new machine. Unless an additional £40,000 could be found from somewhere else the company would be able to replace only one instead of three, and production would fall."

We will now look at two examples of the sort of situation in which the works accountant can help management to decide its current and future policy.

1. The summarised revenue accounts of a business for the two years ended December 31, 1962 and 1963 are as under:

	1962 £	1963 £
Sales	45,000	60,480
Factory cost of sales	30,000	32,500
Factory profit	15,000	27,980
Overheads.	20,000	22,000
Profit	—	5,980
Loss	5,000	—

Towards the end of 1962 plans had been made to cut out waste and introduce new methods in the factory. These plans became effective as from January 1, 1963. As from that date selling prices were increased by 20 per cent. A statement is required showing how much of the increased factory profit is due to each of the following:

1. the increased selling prices;
2. changes in sales volume;
3. the introduction of new methods in the factory.

The increase in factory profit is £12,980. So far as increased selling prices are concerned, the contribution is one-sixth of the 1963 sales figure, i.e. £10,080.

The rate of factory profit in 1962 was $33\frac{1}{3}$ per cent of Sales. Had there been no change in volume in 1963, sales for that year would have been £54,000, i.e. £45,000 plus 20 per cent. Actually, sales were £60,480—showing increased volume of 12 per cent.—£54,000 plus £6,480. This figure of £6,480 at 1962 prices would have been £5,400, $33\frac{1}{3}$ per cent. of which is £1,800.

Factory cost in 1962 was £30,000. Assuming such cost was wholly variable, increased volume of 12 per cent. would give a factory cost of £33,600. But the 1963 figure is only £32,500, indicating that the introduction of new methods has contributed £1,100 towards the increased profit.

So £10,080 plus £1,800 plus £1,100 gives a total of *£12,980*.

Other factors to take into account would include:

1. Given the possibility of increasing sales prices how far in the short run the components of factory cost might also rise.
2. The possibility that in fact these increases had occurred, but that they were to some extent offset by the

improved production methods, resulting in a *net* gain in the latter of £1,100.

3. Whether the gain in (2) above represented a fair return on the initial capital cost of the improved methods.

---

2. This example is more elaborate, and involves again an outline of business policy.

We will assume the facts to be:

A contracted with *B* to supply 4,000 articles a month at a basic price of 25s. each, the basic price being subject to adjustment month by month as follows:

1. The standard wages cost to be 10s. and the standard materials cost to be 12s. 6d. for each article made; the price to be increased or reduced by the amount attributable to any increase or reduction in the rates of wages or price levels of materials as compared with those ruling in the basic period to which the 10s. and 12s. 6d. were related, but not for fluctuations in wages or materials costs attributable to causes other than variations in rates of wages and price levels of materials.

2. The standard proportion of rejects (which are sold as scrap for 1s. each) allowed for in the price of 25s. to be 2 per cent. of the number of articles supplied; rejects to be allocated rateably between the articles supplied to customer *B* and those available for sale to other buyers, and one half of any sum by which the actual loss due to rejects supplied to *B* is increased or reduced by reason of the rejects exceeding or falling short of 2 per cent. to be added to or deducted from the price.

F

The following particulars relate to the month under review:

Number of articles made . . .	9,840
Number of rejects included therein . .	240

	£
Wages, at rates 5 per cent. higher than in basic period . .	5,160
Materials, at rates 2 per cent. higher than in basic period .	6,080
Other manufacturing expenses	1,880

(Institute of Chartered Accountants—adapted).

Question. Are not the two sets of conditions in the contract a little hard to follow?

Answer. No. Not at all. The best plan is to think of the underlying business aspects. With a new product it may be difficult for the manufacturer to commit himself at the outset to a firm selling price. An "escalator" clause in an agreement particularly if, for example, the raw material market is a little unstable can, in the first instance at least, give him some protection.

On the other hand it may be worthwhile, from the manufacturer's point of view, to consider making a special price for one customer who is prepared to take some 40 per cent. of the monthly output of the article in question. Of the basic selling price of 25s., a margin of 2s. 6d. only is available to put towards total overheads and profit. In the particulars furnished, "other manufacturing expenses" of £1,880 are referred to. There is no mention of expenses of distribution or administration. As regards the former the referable expenses may be small: for example, the order may have resulted from a direct inquiry or an exchange of letters, and, further, the customer *B* may himself arrange to collect the goods from *A*'s factory.

Question. What about the rejects position?

Answer. Again, with a new article and probably until production gets into its stride, the risk of producing substandard goods has to be taken into account. While the manufacturer is willing to go some way to meet his customer

(in this case 2 per cent. of the articles supplied, or 80 units) he may feel quite definitely either that he cannot shoulder any loss arising from a bigger proportion of rejects, or, as we see in the second clause, that such loss should be divided between them on an agreed basis.

Finally, a point that can be made is that in this case internal or domestic factors are purely a matter for the manufacturer. A gain arising from more economic use of raw materials in doing the job accrues to him alone, as does any benefit from using a differently rated grade of labour than that allowed for in the specification.

A report can now be built up showing the invoiced selling price and analysing the sources of profit or loss:

For a total output of 9,840 articles during the month, the actual costs were:

Wages	£5,160
Materials	6,080
Manufacturing expenses . .	1,880
	£13,120 or
	£1, 6s. 8d. per unit.

Note.—It would be incorrect to compute the unit cost solely by reference to the "good" production, 9,600 articles, as this would not only inflate the cost but would also conceal the cost to the business of faulty workmanship.

In accordance with para. (2) above, it will be seen that while *B* takes 4,000 units, there are 5,600 available for sale to other buyers. Of this total of 9,600, 240 are rejects, or $2\frac{1}{2}$ per cent. *B*'s proportion thereof is limited to 2 per cent., or a maximum of 80. *B* thus bears one half the net loss arising out of 20 rejects, i.e. the excess of 100 ($2\frac{1}{2}$ per cent. of 4,000) over 80.

The net loss is then:

20 rejects at cost £1, 6s. 8d. .	£26	13	4
Less sold as scrap at 1s. each .	1	0	0
	£25	13	4
One half thereof	£12	16	8

Accordingly the adjusted selling price chargeable to *B* is:

4,000 units at 25s. each . . .		£5,000 0 0
Add permitted increases—		
Basic rate—Wages		
4,000 at 10s.	£2,000	
5 per cent. thereon .		100 0 0
Basic rate—Materials		
4,000 at 12s. 6d.	£2,500	
2 per cent. thereon .		50 0 0
One half loss on rejects, as above .		12 16 8
		£5,162 16 8

So far as the customer is concerned, that is the position. But from the point of view of *A*, as the supplier, there is a loss of £298, 16s. 8d. made up as follows:

4,000 articles at cost £1, 6s. 8d. .	£5,333 6 8
100 rejects at cost £1, 6s. 8d. *less* scrap sales (£5)	128 6 8
	£5,461 13 4
Less adjusted selling price .	5,162 16 8
Loss	£298 16 8

This loss must be analysed and traced to its source, with the following results—

	Gain	*Loss*
Materials—4,000 units at 5d. . .	£83 6 8	
Expenses—4,000 units at 1s. 4d. .		£266 13 4
Loss on rejects.		115 10 0
Net Loss	£298 16 8	

The gain on materials is at 5d. per unit; i.e. £6,080 expended on Materials divided by the output of 9,840 units is 12s. 4d., whereas the permitted increase is 2 per cent. above the basic price of 12s. 6d. making the latter 12s. 9d. in all.

The loss on Expenses arises in the following way. The

basic price of 25s. exceeded wages and materials costs by 2s. 6d., but the actual cost (£1, 6s. 8d.) is greater than the sum of wages (10s. 6d.) and materials (12s. 4d.) by the amount of 3s. 10d. showing a *net* loss of 1s. 4d.

The loss on rejects, £115, 10s. 0d., represents the net loss of £128, 6s. 8d. shown above, *less* the amount recoverable from the customer of £12, 16s. 8d.

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ANSWERS

Chapter IX

1. Works Expenses debit £50. Profit on stores sold £90.
2. Direct labour; direct time; machine hour rate.
3. Possible basis: (*a*) Floor space; (*b*) Metered consumption; (*c*) Numbers supervised; (*d*) Number of lighting points; (*e*) Insured value of assets; (*f*) Book or replacement value of plant; (*g*) Booked time and materials.
4. Materials £23,000; Output £59,375; Gross profit $19\frac{1}{2}$ per cent.
5. Cost per 1,000: £3, 11s.; Profit 10s. 3d.
6. Factory cost: £28,872; Cost per ton: £222; Profit: £7,294.
7. Factory cost: £52,320 or 6s. 10d. per lb.; Selling and general overhead £27,367 or 3s. 6d. per lb.; Total cost 10s. 4d. per lb.
8. At 1,500 hours, 3s. 6d.; At 1,000 hours, 4s. 4d.
9. Round: 18·12d.; Oval: 21·47d.
10. *A.* £956 or 39·85 per cent.; *B.* £645 or 40·35 per cent.; *C.* £1,598 or 53·27 per cent.
11. Direct labour: 144·96 per cent.; 72·8 per cent.; 58·5 per cent.; 38·48 per cent.; 42·28 per cent.
    Direct hourly: 3s. 7·49d.; 1s. 11·29d.; 1s. 5·55d.; 10.77d.; 1s. 4·24d.

Chapter X

1. Profit £14,850; Cost Control £14,450; T.B. totals £14,450.
2. Net profit £502; Cost Control £4,020; T.B. totals £4,020.

3. Works Oncost under £2,865; Office Oncost over £960; Selling Oncost under £1,570; Total memo. Reconciliation account £5,685.

Chapter XI

1. Total cost £4,628; Profit £522.
2. Loss £720.
3. Profit: 1. £1,500; 2. £1,785; 3. £459.
4. Prime cost: £2,538; Factory cost: £3,488.
5. Cost *A*. £1, 18s.; *B*. £3, 3s. 2d.; Stock £11,400 (*B*).
6. Increased profit: £3,000.
7. Production cost: *A*. £2, 8s.; *B*. £1, 8s.; Profit 4s. 6d.
8. Variable £488; Fixed £612; Profit £71.
9. Output: *A*. 7,600; *B*. 6,600; Cost *A*. £1, 2s.; *B*. £1, 15s. 6d.

Chapter XIV

1. Cost 1948: £223,280; Cost 1949: £305,080; Profit 1949 £32,420.
2. Total cost £3,710; Net material variance £18, 6s. 8d.; Adverse overhead volume and expenditure variance each £75.

Chapter XV

1. Standard profit £828; Net variance (loss) £308.
2. Factory cost per bottle 7·4d. or £3,090 in total; Value factory stock at 7·4d. and subsidiary stock at 10·5d. less provision for profit.

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